Mariners Weather Log

Vol. 50, No. 3 December 2006

Cold front overhead moving across the house of the Training Ship Empire State VI.
For more information see article page 12.

Mariners Weather Log

ISSN 0025-3367

U.S. Department of Commerce
Carlos M. Gutierrez, Secretary

VADM Conrad C. Lautenbacher, Jr. (USN-Ret.)
Under Secretary of Commerce for Oceans and Atmosphere

National Weather Service
Brig. Gen. David L. Johnson (USAF-Ret.)
Assistant Administrator for Weather Services

Editorial Supervisor
Robert A. Luke

Articles, Photographs, and Letters should be sent to:

Mr. Robert A. Luke, Editorial Supervisor
Mariners Weather Log
NDBC (W/OPS 51)
Bldg. 3203
Stennis Space Center, MS 39529-6000

Phone: (228) 688-1457 Fax: (228) 688-3923
E-Mail: robert.luke@noaa.gov

Welcome once again to another exciting issue of the Mariners Weather log (MWL). I realize that your time is precious this holiday season, and taking time out of your hectic schedule to read the MWL is truly appreciated. Just think of it as "Me Time"—time to hide away from the hustle and bustle of the stores, family issues, and wondering if a chain saw or snow tires is a good gift for your wife.

We offer some nice articles that will enlighten, remind, or at least make you ponder how the physical world operates. Dr. Hsu from Louisiana State University gives an in-depth analysis of significant heights during Hurricane Katrina and also estimating wind speeds during Hurricanes. Skip Gilham offers yet another intriguing article about the loss of the **Mataafa** due to a Great Lakes' storm more powerful than the one that took the **Edmund Fitzgerald**. First Class Cadet Naldo Garcia from the State University of New York's Maritime College has provided some great photos and shared his experienced of crossing the Atlantic Ocean this summer. Another great article is a collaboration between the United Kingdom and the Netherlands VOS program managers that tells how the transiting mariners can report unusual sea occurrences, whether meteorological, astronomical, or even biological, by using the "WIKILOG." We also have our stalwart articles that cover the recent climatological events, as well as the in-depth look in the Marine Weather review. The MWL also says thank you to a long time supporter and friend. Mr. Lee Chesneau has finally retired from government service and is striking out in the commercial world. Lee has supported the VOS program and the MWL for many years by authoring such great articles such as "Mariners Guide to the 500-Mb Chart."

Once again, I hope you enjoy this offering of the MWL, so find a nice comfortable spot and have a little "Me Time" on us.

Regards—Luke ⚓

p.s.—The wife actually does enjoy power tools as gifts—got to love that!

Some Important Web Page Addresses

NOAA	http://www.noaa.gov
National Weather Service	http://www.weather.gov
National Data Buoy Center	http://www.ndbc.noaa.gov
AMVER Program	http://www.amver.com
VOS Program	http://www.vos.noaa.gov
SEAS Program	http://seas.amverseas.noaa.gov/seas/seasmain.html
Mariners Weather Log	http://www.vos.noaa.gov/mwl.shtml
Marine Dissemination	http://www.nws.noaa.gov/om/marine/home.htm
U.S. Coast Guard Navigation Center	http://www.navcen.uscg.gov/marcomms/

See these Web pages for further links.

Table of Contents

The Marine Observers' Log—"Wikilog" 4

Nowcasting the Significant Wave Height During a Hurricane 6

Estimating the Wind Speed During a Hurricane at Sea 8

Shipwreck: **Mataafa** 10

State University of New York Maritime College (SUNY) Summer Sea Term 12

Operational Ocean Prediction and the Mariner 15

It's "Eight Bells" for Longtime Marine Forecaster, Educator, and VOS Supporter, Lee Chesneau 19

Departments:

Marine Weather Review

Marine Weather Review—North Atlantic Area May through August 2006 20

Marine Weather Review—North Pacific Area May through August 2006 30

Tropical Atlantic and Tropical East Pacific Areas May throgh August 2006 38

Mean Circulation Highlights and Climate Anomalies, May through August 2006 42

VOS Program

VOS Program Awards 44

New Recruits: July 1, 2006 through October 31, 2006 52

VOS Cooperative Ship Report January through October 2006 54

Points of Contact 69

The Marine Observers' Log—"WikiLog"

Sarah North, UK Met Office & Frits Koek, Koninklijk Nederlands Meteorologisch Instituut (KNMI)

Have you ever witnessed unusual meteorological conditions at sea, or observed a remarkable astronomical phenomenon during your watch? Or perhaps your ship has been visited by a school of dolphins, a pod of whales, or by some strange looking seabird? Maybe you have been surprised by a meteor or UFO racing across the night sky, or found your ship surrounded by a bioluminescent ocean?

Whenever something curious or unusual is observed at sea there is a natural inclination to want to share the experience with your colleagues on board. However, such observations may have wider scientific interest and could be of great value to researchers and experts ashore.

For many years, voluntary marine observers have been encouraged by National Meteorological Services to supplement their standard weather reports with details of any interesting or significant phenomena observed at sea. Traditionally, these observations were recorded in dedicated sections of the Ships Meteorological Logbook. Having been collected by visiting Port Meteorological Officers, these observations were often reproduced in marine publications and journals. The most interesting observations were also sent to consulting experts for their professional comments, which could then be fed back to the observer. Was it really a basking shark, a black footed albatross, St Elmo's Fire, crepuscular rays, a lunar rainbow, abnormal refraction etc. that was observed on that day in that particular location?

In recent years, the use of hardcopy logbooks has been largely phased out by many National Meteorological Services and have been gradually replaced by the use of electronic logbooks, such as TurboWin* and SEAS. While the primary function of these electronic logbooks continues to be to record the weather observations, they nevertheless include modules to allow observers to record a variety of additional observations. In particular, TurboWin logbook software, which is now in use on the majority of European Voluntary Observing Ships, includes a dedicated section to permit additional phenomena reports to be logged and transmitted back to the National Meteorological Service that recruited the ship to undertake weather observations.

Because such additional observations are now recorded in electronic format it is a comparatively easy process to transfer them to a website so that they can be accessible to everyone—observers, experts and laymen alike—who have access to the internet. To this end a dedicated new website has recently been established. Although the new website is primarily intended to provide a repository for any interesting or significant observations that have been reported by voluntary observers in electronic logbooks, reports are welcome from all legitimate sources. The site has therefore been given the title "The Marine Observers' Log" and is available to everyone at the following URL:

http://esurfmar.meteo.fr/wikilog

Because the Marine Observers' Log has been developed for the web using the well established MediaWiki software, it is already becoming known by the abbreviated name "Wikilog."

An important feature of the website is the fact that it is not static. Anyone with a recognised interest in marine observing can make a request to open an account (details on the website) and add observations directly if they so wish. Each page on the site also contains a discussion tab for consulting experts, scientists, researchers, experts and other interested observers to add comments or feedback on the observations. Links from observations can also be made to related information drawn from the popular Wikipedia encyclopedia.

Observations are archived in the Marine Observers' Log by category and date. Although the website was only set up a few months, ago nearly 400 observations have already been logged. It should be noted, however, that all material included on the website is subject to copyright provisions, which must closely be observed.

It is hoped that marine observers reading the Mariners Weather Log will appreciate the value of the new website and will contribute any interesting observations they experience while at sea.

Acknowledgment—Particular thanks must be given to Pierre Blouch, E-SURFMAR Programme Manager, for all his help in setting up the new Wikilog website.

* Full details of the TurboWin programme are available at http://www.knmi.nl/turbowin, where copies of the program and associated utilities can be downloaded free of charge.

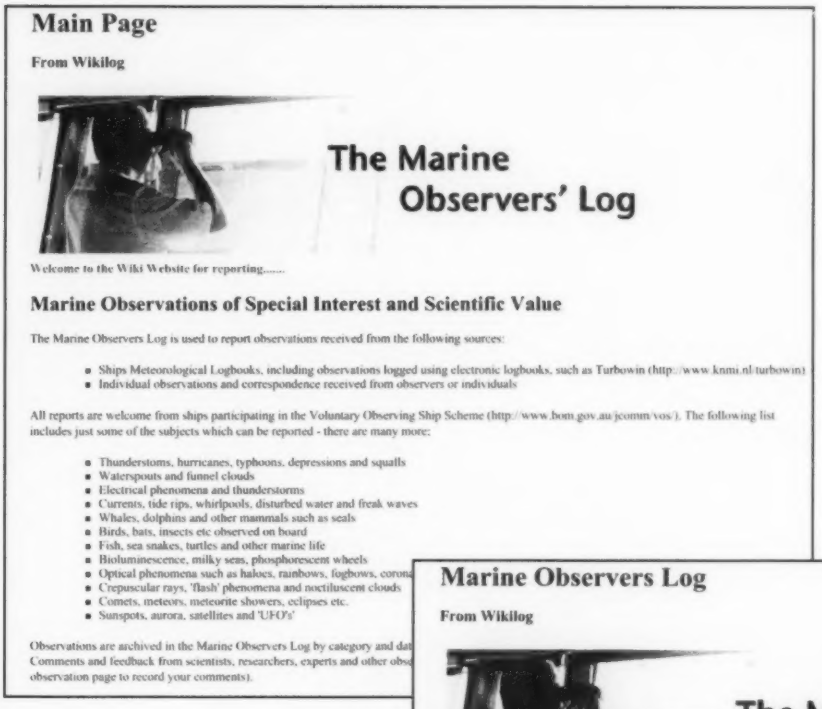
* Under a cooperative agreement between the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Coast Guard (USCG), software has been created to assist Volunteer Observing Ships (VOS) in submitting marine weather reports and participating in the Automated Mutual-assistance VEssel Rescue system (AMVER). For Information on AMVER contact:

Ben Strong 1-212-668-7762
e-mail: bmstrong@batteryny.uscg.mil

http://www.amver.com/

* NOAA's SEAS (Shipboard Environmental data Acquisition System) program relies on volunteer observers to report weather at least four times per day at 00Z, 06Z, 12Z, and 18Z.For Information on SEAS contact: Your nearest U.S. Port Meteorological Officer or SEAS representative.

or visit the SEAS website at:
http://seas.amverseas.noaa.gov/seas/



Main Page

From Wikilog

The Marine Observers' Log

Welcome to the Wiki Website for reporting.....

Marine Observations of Special Interest and Scientific Value

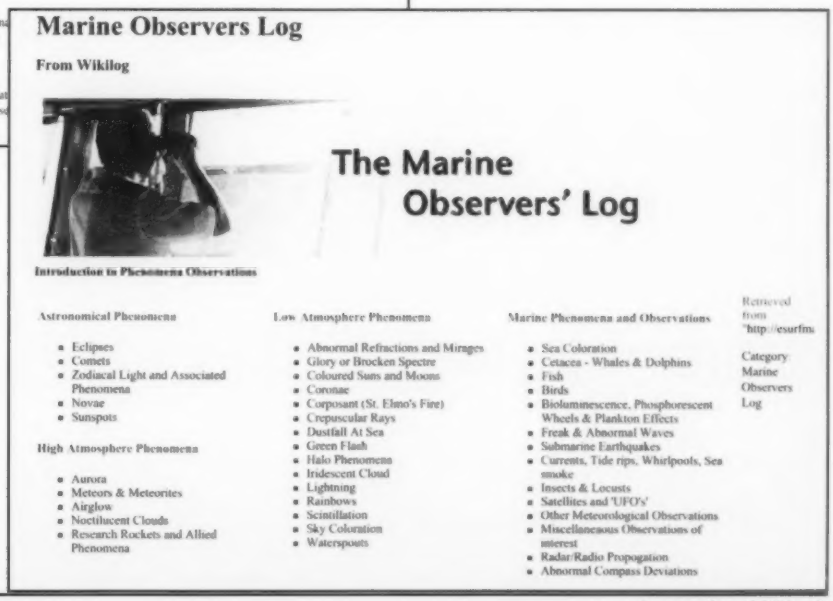
The Marine Observers Log is used to report observations received from the following sources:

- Ships Meteorological Logbooks, including observations logged using electronic logbooks, such as Turbowin (http://www.knmi.nl/turbowin)
- Individual observations and correspondence received from observers or individuals

All reports are welcome from ships participating in the Voluntary Observing Ship Scheme (http://www.bom.gov.au/jcomm/vos/). The following list includes just some of the subjects which can be reported - there are many more:

- Thunderstorms, hurricanes, typhoons, depressions and squalls
- Waterspouts and funnel clouds
- Electrical phenomena and thunderstorms
- Currents, tide rips, whirlpools, disturbed water and freak waves
- Whales, dolphins and other mammals such as seals
- Birds, bats, insects etc observed on board
- Fish, sea snakes, turtles and other marine life
- Bioluminescence, milky seas, phosphorescent wheels
- Optical phenomena such as halos, rainbows, fogbows, corona
- Crepuscular rays, 'flash' phenomena and noctiluscent clouds
- Comets, meteors, meteorite showers, eclipses etc.
- Sunspots, aurora, satellites and 'UFO's'

Observations are archived in the Marine Observers Log by category and dat
Comments and feedback from scientists, researchers, experts and other obs
observation page to record your comments).



Marine Observers Log

From Wikilog

The Marine Observers' Log

Introduction to Phenomena Observations

Astronomical Phenomena

- Eclipses
- Comets
- Zodiacal Light and Associated Phenomena
- Novae
- Sunspots

High Atmosphere Phenomena

- Aurora
- Meteors & Meteorites
- Airglow
- Noctilucent Clouds
- Research Rockets and Allied Phenomena

Low Atmosphere Phenomena

- Abnormal Refractions and Mirages
- Glory or Brocken Spectre
- Coloured Suns and Moons
- Coronae
- Corposant (St. Elmo's Fire)
- Crepuscular Rays
- Dustfall At Sea
- Green Flash
- Halo Phenomena
- Iridescent Cloud
- Lightning
- Rainbows
- Scintillation
- Sky Coloration
- Waterspouts

Marine Phenomena and Observations

- Sea Coloration
- Cetacea - Whales & Dolphins
- Fish
- Birds
- Bioluminescence, Phosphorescent Wheels & Plankton Effects
- Freak & Abnormal Waves
- Submarine Earthquakes
- Currents, Tide rips, Whirlpools, Sea smoke
- Insects & Locusts
- Satellites and 'UFO's'
- Other Meteorological Observations
- Miscellaneous Observations of interest
- Radar/Radio Propogation
- Abnormal Compass Deviations

Retrieved from "http://esurfm

Category: Marine Observers Log

Nowcasting the Significant Wave Height During a Hurricane

Professor S. A. Hsu, Louisiana State University, E-mail: sahsu@lsu.edu

In order to steer a ship away from danger imposed by a tropical cyclone, such as a hurricane, short-term forecasts from minutes to a few hours, or nowcasting, is needed to supplement the "official" forecast. This study was motivated by the following facts: During Hurricane Katrina (see, e.g., Campbell, 2006) at 11GMT on 29 August 2005, the National Data Buoy Center (NDBC) buoy 42040 situated at the water depth of 444 m (see www.ndbc.noaa.gov and www.nhc.noaa.gov for location with respect to the hurricane track and intensity) measured the significant wave height (for definition see, e.g., Ainsworth, 2006) H_s = 16.91 m (or 55 ft), dominant wave period T_p = 14.29 sec, wind speed at 5 m U_5 = 27.3 m/s with gust to 33.9 m/s, and the sea-level pressure = 979.3 mb. If we plot these measured H_s and T_p values in an operational wave forecasting nomograph (see, e.g., Hsu, 1988, p. 222, Fig. 8.28), it is found that the required wind speed to generate these 55 ft waves should be at least twice that measured. This indicates that one cannot use the local (in situ) wind to estimate the sea state, particularly when a hurricane is approaching the coast since the wind speed may be reduced faster than the changes in sea state in deep water. Note that since the wave steepness (H_s / Lp where Lp is the wave length, i.e., H_s / 1.56 T_p^2 = 16.91 / 1.56 $(14.29)^2$ = 0.053) is larger than 0.030, the sea state is not in the fully developed (or swell) condition (for more detail, see Hsu 2006) but was still in the windsea stage.

An alternate method is as follows: according to Hsu (1991)

$$H_{s\ max} = 0.2\ (1013 - P_0) \qquad (1)$$

where H_s max is the maximum H_s (in meters), and P_0 (in mb) is the hurricane's minimum sea-level pressure (which is normally provided by an "official" agency such as the National Hurricane Center). Further verification of Eq. (1) is provided in ***Figure 1*** (based on data provided in Abel et al. (1989)). It can be seen that Eq. (1) is useful operationally.

Now, according to Hsu et al. (2000),

$$\frac{H_{s\gamma}}{H_{s\ max}} = 1.06 - 0.11\ \frac{\gamma}{R} \qquad (2)$$

and

$$\frac{R}{\gamma} = \ln\left(\frac{1013 - P_0}{P_\gamma - P_0}\right) \qquad (3)$$

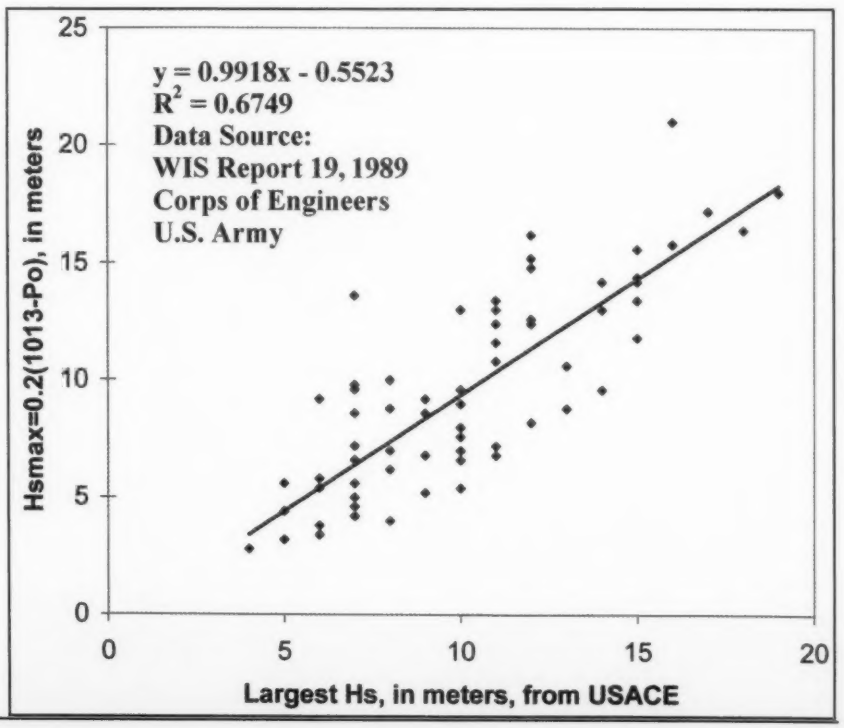


Figure 1. A verification of the computed maximum significant wave height.

where $H_{s\,max}$ is the H_s value at distance γ away from the hurricane center, R is the radius of maximum wind, and P_γ is the pressure at γ. Note that since a tropical storm begins with wind of 18 m/s (35 kts), P_γ needs to be approximately 1000 mb or less.

During Katrina in the Gulf of Mexico at 18GMT on 28 August 2005, P_0 = 902 mb. Since P_γ = 979.3, $H_{s\gamma}$ = 16.91 m and T_p = 14.29 sec at buoy 42040 at 11GMT on 29 August, and from Eq. (3),

$$\frac{R}{\gamma} = \ln\left(\frac{1013 - 902}{979.3 - 902}\right) = \ln\left(\frac{111.0}{77.3}\right) = 0.36$$

or γ / R = 2.78.

$$\frac{H_{s\gamma}}{H_{s\,max}} = 1.06 - 0.11 \times 2.78 = 0.75$$

Now, by substituting this value into Eq. (2) we have

or

$$H_{s\gamma} = 0.75\, H_{s\,max} \qquad (4)$$

Also, substituting P_0 = 902 into Eq. (1), one gets

$$H_{s\,max} = 22.2\ m \qquad (5)$$

From Eqs. (4) and (5), we have $H_{s\gamma}$ = 16.74 m, which is in excellent agreement with the measured value of 16.91 m at buoy 42040.

Another example is based on the same data sources, but for Hurricane Ivan in September 2004 in the Gulf of Mexico that at 00GMT on 15 September, P_0 = 928 mb, and from Eq. (1), H_s max = 17.0 m. At buoy 42003 at 01GMT on 15 September, P_γ = 993.7 mb, $H_{s\gamma}$ = 11.04 m and T_p = 12.9 sec. Thus $H_{s\gamma} / L_p$ = 11.04 / (1.56 x 12.9²) = 0.043 indicating that sea state was not fully developed. Now, substituting P_0, P_γ, and $H_{s\,max}$ values into Eqs. (2) and (3) as before, we get γ / R = 3.88 and $H_{s\gamma}$ = 0.63 x 17.0 = 10.7 m. This $H_{s\gamma}$ value is also in excellent agreement with the measured $H_{s\gamma}$ = 11.04 m.

It is thus concluded that the significant wave height during a tropical cyclone can be "nowcasted" using the method proposed in this study. Note that in the open sea the wave height may be higher due to added effects by the swells. Note also that the wave height is generally lower on the left-hand side of hurricanes due to the opposing effects of wind and waves, if one moves with the storm track (see Hsu et al., 2000).

References

Abel, C. E., B. A. Tracy, C. L. Vincent, and R. E. Jensen, *Hurricane Hindcast Methodology and Wave Statistics for Atlantic and Gulf Hurricanes from 1956 - 1975*, (WIS Rept. 19, U.S. Army Corps of Engineers, P.O. Box 631, Vicksburg, MS, 39181-0631, 1989).

Ainsworth, T., *When do ocean waves become 'significant'?* A closer look at wave forecasts, (Mariners Weather Log, Vol. 50, No. 1 (April 2006). Also available online at http://vos.noaa.gov/mwl.shtml).

Campbell, P. *From the PMO Desk: Hurricane Katrina aftermath,* (Mariners Weather Log, Vol. 50, No. 1 (April 2006), pp. 30 - 36. Also available online at http://vos.noaa.gov/mwl.shtml).

Hsu, S. A., Coastal Meteorology. (Academic Press, San Diego, CA, 1988).

Hsu, S. A., *Forecasting hurricane waves*, (Mariners Weather Log, Vol. 35, No. 2, 1991, pp. 57 -58).

Hsu, S. A., *Measurements of overwater gust factor for NDBC buoys during hurricanes.* (Article # 2006-EJ2 [pdf] in NWA Electronic Journal of Operational Meteorology, 2006. Available online at http://www.nwas.org/ej/index.html).

Hsu, S. A., M. F. Martin, Jr., and B. W. Blanchard, *An evaluation of the USACE's deepwater wave prediction techniques under hurricane conditions during Georges in 1998*, (Journal of Coastal Research, Vol. 18, No. 3, 2000, pp. 823 - 829).

Estimating the Wind Speed During A Hurricane at Sea

Professor S. A. Hsu, Louisiana State University, email: sahsu@lsu.edu

During a hurricane the wind speed and its vertical variation are essential to know not only for maritime safety but also for wind loading and wave prediction. According to Hsu (2003a) (for a detailed derivation see Hsu, in press),

$$U_{10} = 6.3\ (\ 1013 - P\ )^{0.5} \qquad (1a)$$

and its limit

$$U_{10\ max} = 6.3\ (\ 1013 - P_0)^{0.5} \qquad (1b)$$

where U_{10} (in m/s) is the wind speed at 10 m, P (in mb) is the pressure at a site in question, U_{10} (in m/s) is the maximum U_{10} and P_0 is the hurricanes minimal sea-level (central) pressure (in max mb).

An example to apply Eq. (1) is provided as follows (for satellite meteorology, see Hsu 2003a): During Hurricane Lili (2002), buoy 42003 located about 280 km to the east of the center recorded P = 1011.1 mb. From Eq. (1a), $U_{10} = 6.3(1013 - 1011.1)^{0.5} = 8.7$ m/s which is in good agreement with the measured value of 9.2 m/s at 42003. Also, since $P_0 = 956.1$ mb, from Eq. (1b) U_{10} max $= 6.3(1013 - 956.1)^{0.5} = 47.5$ m/s, which is in excellent agreement with the measured value of 47.2 m/s at buoy 42001 near the eyewall.

To test this relationship further, new data is employed which recently became available due to Hurricane Wilma in 2005 and its path near National Data Buoy Center buoy 42056 in the northeastern Caribbean Sea (see www.ndbc.noaa.gov and www.nhc.noaa.gov). In addition, data from Hurricane Kate in 1985 near buoy 42003 (Hsu, 2003b) and Lili in 2002 near buoy 42001 (Hsu, 2003a) are incorporated into our analysis. Note that since the standard mean sea-level pressure for 30°N in July and 15°N annual is1013 mb (Atkinson, 1971), we retain all pressure values less than 1013 mb from these three buoys. The only exception occurred during the passage of the eye of Kate over 42003 on November 20 at 18 Z, when U10 was only 16.6 m/s and P was 957.1 mb (Hsu, 2003b).

From our result presented in ***Figure 1***, it can be seen that the relationship between Eq. (1) and U_{10} as measured by buoys is almost one-on-one, meaning that Eq. (1) is further verified for operational applications.

The vertical variation of the wind speed is also important.

$$\frac{U_z}{U_{10}} = \left(\frac{z}{10}\right)^{0.125} \qquad (2)$$

According to Hsu (2003b and 2006) when U_{10} is greater than 20 m/s (or 39 kts),

where U_z is the wind speed at height z other than 10 m.

$$\frac{U_{30\,m}}{U_{10\,m}} = \left(\frac{30}{10}\right)^{0.125} = 1.15 \qquad (3)$$

For example, if the wind speed at 30 m (or 100 ft) is needed, then from Eq. (2)

or U_{30} is approximately 15% higher than U_{10}.

From Eq. (1) and ***Figure 1*** we conclude that

$$U_{10}\ (\ \textit{in knots}\ ) = 12.2\ (\ 1013 - P\ )^{0.5} \qquad (4)$$

$$U_{10}\ (\ \textit{in mph}\ ) = 14.1\ (\ 1013 - P\ )^{0.5} \qquad (5)$$

where P is the pressure in mb as before.

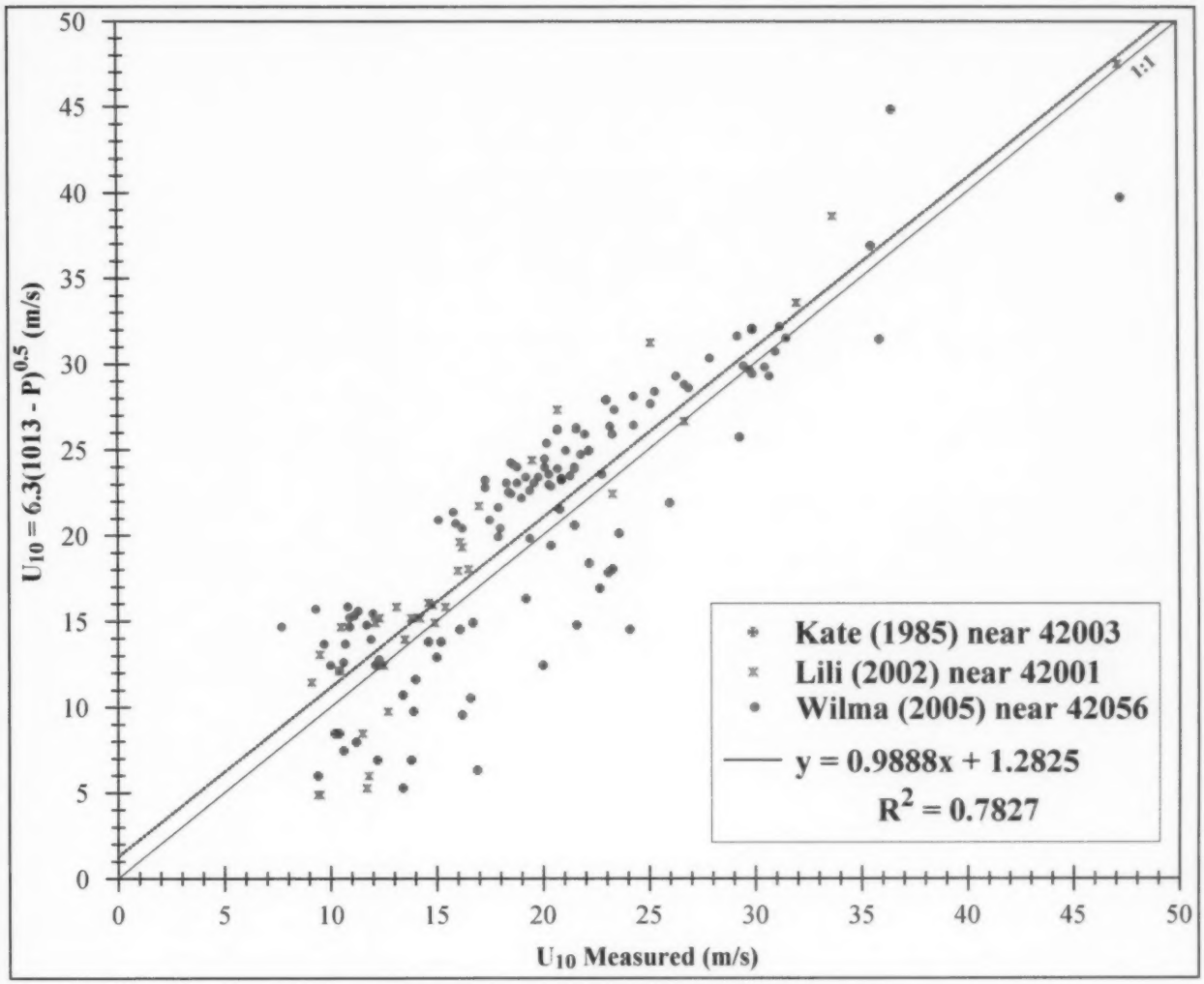


Figure 1. A verification of Eq. (1) against buoy measurements.

References

Atkinson, G. D., *Forecaster's Guide to Tropical Meteorology*, (Tech. Rept. 240, Air Weather Service, U.S. Air Force, 1971).

Hsu, S. A., *Nowcasting the wind speed during a hurricane at sea*, (Mariner's Weather Log, Spring/Summer 2003a, Vol. 1, No. 1, pp. 10-11).

Hsu, S. A., *Estimating overwater friction velocity and exponent of power-law wind profile from gust factor during storms*, (Journal of Waterway, Port, Coastal, and Ocean Engineering, July/August 2003b, Vol. 129, No. 4, pp. 174-177).

Hsu, S. A., *Measurements of overwater gust factor from NDBC buoys during hurricanes*. (2006-EJ2, 2006, in www.nwas.org/ej/index.html).

Hsu, S. A., *Air-Sea Interaction*, (in "Encyclopedia of Water" by Wiley, in press).

Shipwreck: *Mataafa*

Skip Gillham, Vineland, Ontario, Canada

When Great Lakes sailors think of bad storms, a few naturally come to mind. Black Friday, October 20, 1916, claimed four ships of Lake Erie while the Armistice Day storm of November 11, 1940, also resulted in lost ships and lost lives. More recent "Gales of November" sent the **Carl D. Bradley**, **Daniel J. Morrell** and **Edmund Fitzgerald** to the bottom in 1958, 1966 and 1975, respectively.

Although devastating, these fall storms did not have the destruction of the "Great Storm" of November 1913, or the one that smashed the Lake Superior region in November 1905. The most dramatic casualty of the latter was the **Mataafa**.

This vessel had been built on speculation by the Cleveland Shipbuilding Company of Lorain, Ohio, and it was launched on February 25, 1899. It initially saw some service as PENNSYLVANIA on charter from the builders but was sold before the end of the first year.

The 450-foot long by 50-foot wide bulk carrier was acquired by the Minnesota Steamship Company and renamed **Mataafa**. The first full season of 1900 was not without difficulty as the ship hit a rock in the Straits of Mackinac and was leaking upon arrival Chicago on August 23. Then, while upbound, the ship went aground above the Soo Locks on September 1.

Mataafa became part of the original Pittsburgh Steamship Division of United States Steel when that company was organized in1901. It suffered another grounding, due to fog, on Knife Island Reef, Lake Superior, on June 2, 1902, but the worst was yet to come.

A gale swept Lake Superior after extraordinary high pressure began to fall on November 27, 1905. Snow, ice pellets, freezing temperatures and mountainous seas caused havoc all over the big lake. The most spectacular accident claimed the **Mataafa**.

The ore-laden freighter departed Duluth, towing the consort barge **James Nasmyth,** in the late afternoon of November 27 only to be attacked on the open lake. After a futile battle with the elements, the Captain of **Mataafa** decided to turn back and seek shelter. He managed to turn his freighter and the trailing barge, but trying to bring both through the port entry in these conditions was unwise. As a result, the **James Nasmyth** was left at anchor on the lake to ride out the storm.

On the run for the harbor entry, **Mataafa** got caught by the current and was pushed off course. The hull hit bottom, smashed the pier and soon lost power. The ship and all on board were at the mercy of the wind, waves, and current; it was driven aground and broken into three pieces.

Of the twelve sailors on the settling stern, only three managed to work their way forward to the shelter of the Captain's cabin. Nine more perished from exposure when the boilers went out, taking the last of the heat.

It was not until conditions subsided on the morning hours of November 19 that the sailors could be rescued. The battered remains of Mataafa are shown in a photo from the collection of the Canal Park Museum through the courtesy of Patrick Labadie.

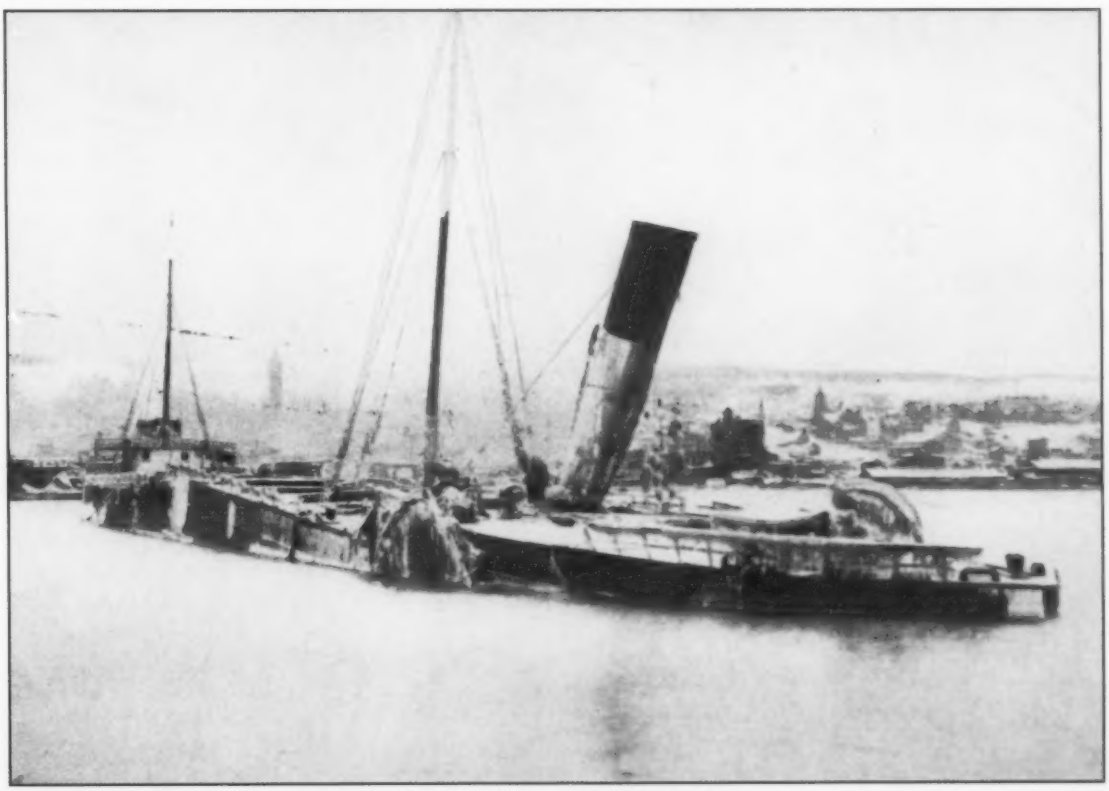
Amazingly, the battered **Mataafa** was not only refloated, but it was repaired and operated until 1964. The ship continued to create a little more excitement, including a collision that sank the **Sacramento** at Duluth on October 13, 1908; rescued 19 from the ill-fated wooden steamer **New York** in Lake St. Clair on July 17, 1912; slammed into a pier at Superior on June 27, 1914; and rescued the crew of the barge **Commodore** off South East Shoal, Lake Erie, on June 17, 1918.

Mataafa was rebuilt in 1926 and converted from an ore carrier to an automobile carrier in1946. In later years the ship served the Nicholson Transit Co. loading new automobiles at Detroit for delivery around the Great Lakes.

The ship was tied up at Buffalo during 1964 and was sold to Marine Salvage for scrap. **Mataafa** is shown at Port Colborne en route from the Great Lakes in November 1964. Following a transatlantic tow, the ship was pulled into Hamburg, West Germany, on July 19, 1965, and was dismantled.

As a sideline, the barge **James Nasmyth**, left to the mercy of the seas in 1905, survived the tumult. It worked as a barge into the early 1950's and was then rebuilt as the powered freighter **Pic River**. This ship was not broken up until 1984.

The *Mataafa* shown at Port Colborne, November 11, 1964.



The battered remains of Mataafa.

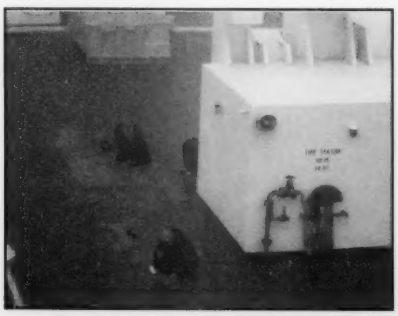
State University of New York Maritime College (SUNY) Summer Sea Term

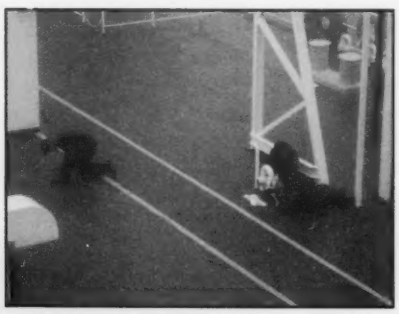
Naldo R. Garcia, 1/C, Marine Environmental Science Major, SUNY Maritime College

Naldo Garcia on the fast rescue boat while the training ship is at anchor.

Summer Sea Term 2006 was a remarkable experience for those who had never gone out to sea. In addition to affording us the opportunity to visit foreign countries, being aboard the **Training Ship Empire State VI** for two months gave us intensive "real life" experience and training for obtaining either the third mate's or third assistant engineer's license. Cadets also received an understanding and appreciation of the natural world (i.e. heavy seas, strong winds and intense rain) that one encounters during extended periods at sea. By way of example, our trip across the Atlantic, which took a little less than two weeks, moved us through some interesting weather patterns. We encountered 15–20 ft seas and even gale force winds. Through pre-cruise and onboard cruise training we learned that these condition influence ship's speed and how to work with varying weather conditions. We discovered how essential it is to know how to read and interpret charts as well as meteorological information.

The ship underway while in heavy fog.





Cadets working on deck while in heavy fog.

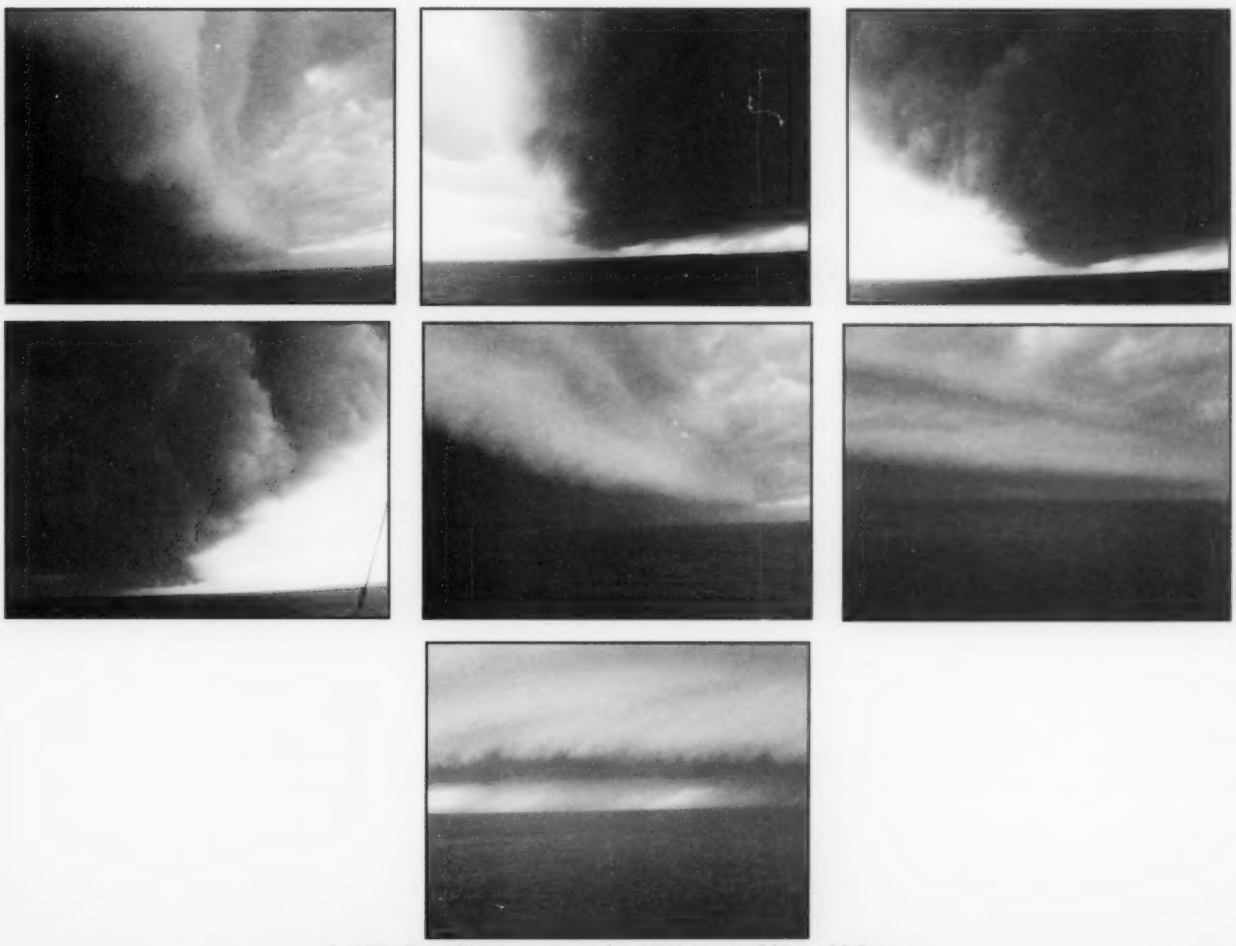
Meteorological and navigational information is received daily through the ships NAVTEX, which was read by cadets and officers who then determined if any of the information was applicable to our ship or should affect the voyage plan.

Before the **T.S. Empire State VI** departed across the Atlantic, she was anchored off Montauk, New York to allow several cadets to join the ship. While at anchor, a well structured strong cold front approached from the west. Observing the movement of this front was impressive and represented a first real life experience of this type of meteorological phenomenon for many of the cadets and officers onboard. Wind speed changes and dramatic temperature drop of several degrees over the course of a few minutes were felt as the front moved overhead.

While at sea, the officers ensured that the cadets made weather observations on a daily basis and sent out weather reports at least every 6 hours. Since watches were stood on 4-hour rotation, the cadets on watch were required to

send at least one weather report at the designated times (0000Z, 0600Z, 1200Z and 1800Z). For training purposes and familiarization with the weather observation, there are also reports sent out at 0300Z, 0900Z, 1500Z and 2100Z. This allowed all cadets to send at least one weather report per watch. The weather reports were sent to the AMVER/SEAS program daily. The AMVER (Automated Mutual-assistance Vessel Rescue) is a reporting system operated by the U.S. Coast Guard. The SEAS (Shipboard Environment (data) Acquisition System) is operated by the U.S. National Oceanic and Atmospheric Administration (NOAA) and is also part of the Volunteer Observing Ship (VOS) program. The AMVER/SEAS reports a vessels description and location to the USCG in case a vessel in distress is in need of help. It also reports both oceanographic and meteorological data to NOAA.

After departing from our last port (Dublin, Ireland) en route back to SUNY Maritime College in the Bronx, New York, we encountered heavy fog, which we thought would clear up in a matter of hours. The fog did not clear up in the same timely manner as it had usually done in the past. The route we had taken from Europe back home was different from our usual route. We were in higher latitudes then we usually sail through; the higher latitudes, the colder waters and an extended warm front may have been all that was necessary for several days of fog. The fog was a state of weather we had to deal with, whether we were working out on deck or navigating on the bridge. Navigating was difficult without being able to see farther than the bow of the ship for several days, but it is all part of being out at sea.



A collection of images capturing the approaching cold front.

The **Training Ship Empire State VI** is owned by the Maritime Administration, and in time of emergency it can be activated by the federal government. After the devastation of Hurricane Katrina in New Orleans, the **T.S.E.S. VI** was used to berth over 700 workers and employees from ConocoPhillips to repair an oil refinery in Belle Chasse, Louisiana. The ship was readied in a record time by the cadets and served the employees for six months while in Louisiana.

Cold front overhead moving across the house of the ship

Training ship at anchor.

Operational Ocean Prediction and the Mariner

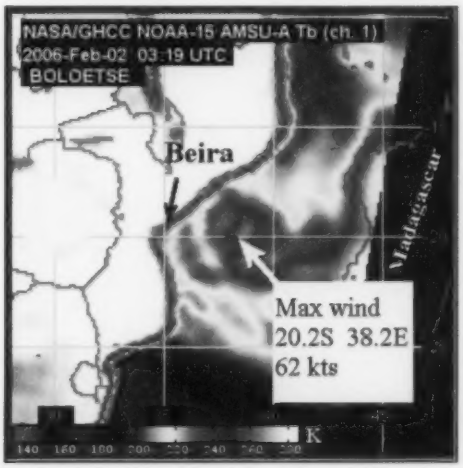
Ian T. Hunter, South African Weather Service

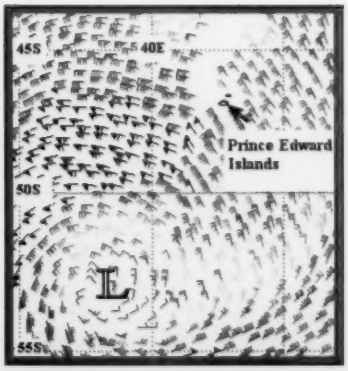
The term "metocean" is now commonly used by marine weather services to indicate the atmosphere/ocean mix of products that many clients working in a marine environment require. Metocean satellites provide information on sea surface temperatures, ocean surface winds and waves, sea surface heights and even biological information relevant to fisheries.

Numerical Weather Prediction (NWP) models have increased steadily in accuracy since the late 1970's. Similarly the wave prediction models had become of significant benefit to ocean users by the end of the 80's. In both cases the improvements were largely due to ever-increasing model resolution, improved representation of the actual physical processes and the rapidly increasing volume of input data from satellites. The deployment of ocean data collection platforms has also been a significant factor. For example, satellite-borne radar altimeters provide wave height measurements that are fed into the wave models, in addition to in-situ wave measurements from moored buoys. Wind vectors from scatterometers, such as the one flying on the QuikSCAT satellite, have been assimilated into the NWP models since 2001.

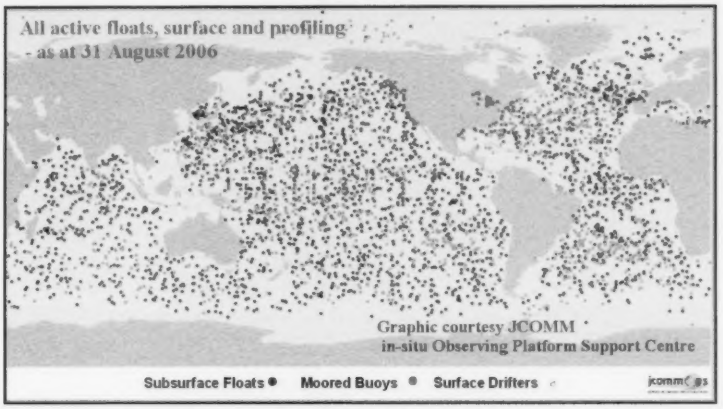
Tropical cyclone track predictions have also improved considerably. With a very quiet 2005/6 season in the South-West Indian Ocean Basin, the only significant system to enter the Mozambique Channel was "Boloetse." Although it seemed inevitable that it would hit the coast north of Beira, the models predicted the sudden southward swing two days in advance. There was no significant wind or wave damage on the Mozambican coast.

Pictured on the right, sensors operating in the microwave portion of the electromagnetic spectrum are affected little by cloud or rain. Data from the AMSU-A sounder (flying on the more recent NOAA POES satellites) - has resulted in more accurate analyses of tropical cyclones such as "Boloetse."





Pictured on the left, ocean surface winds derived from the QuikSCAT satellite on 18 August 2006. On this day the SA Agulhas was unloading cargo at Marion Island (site of an important South African weather base and part of the Prince Edward Island group). She confirmed winds of over 50 kts. These "scatterometer" winds are routinely assimilated into the NWP models.



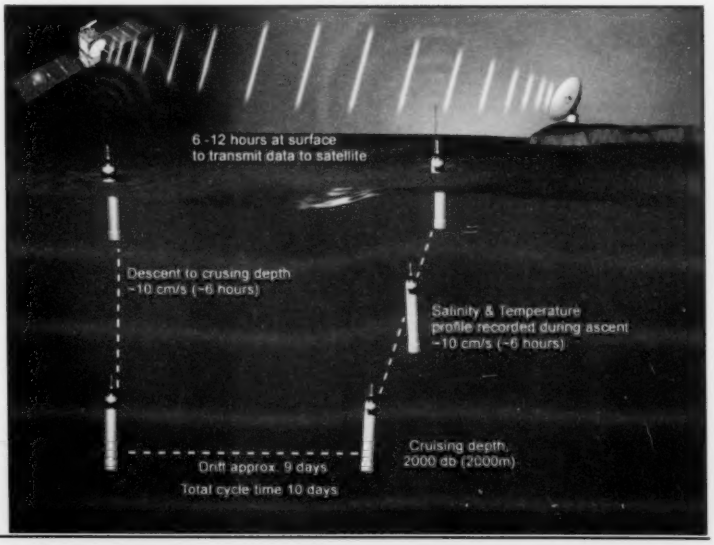
This map shows the position of all floating platforms which were collecting metocean data as at 31 August 2006. One surface drifter deployed by the South African Weather Service in September 2001 continued to provide barometric pressure to the numerical weather prediction models for almost four years. Note that there are very few moored, metocean buoys in the Southern Hemisphere.

Image located at: http://wo.jcommops.org/cgi-bin/WebObjects/Argo.woa/1/wo/6lZlqiadEclLzGrrB2otX0/9.0.0.3.1

Whereas satellites provide global coverage, in-situ data are still extremely important. Satellite sensors still have to be calibrated using in-situ data and there are some parameters they cannot measure (e.g., sea level pressure). Furthermore, most of the ocean surface measurements come from polar-orbiting satellites (as opposed to the geostationary satellites)—i.e., their temporal coverage is generally poor.

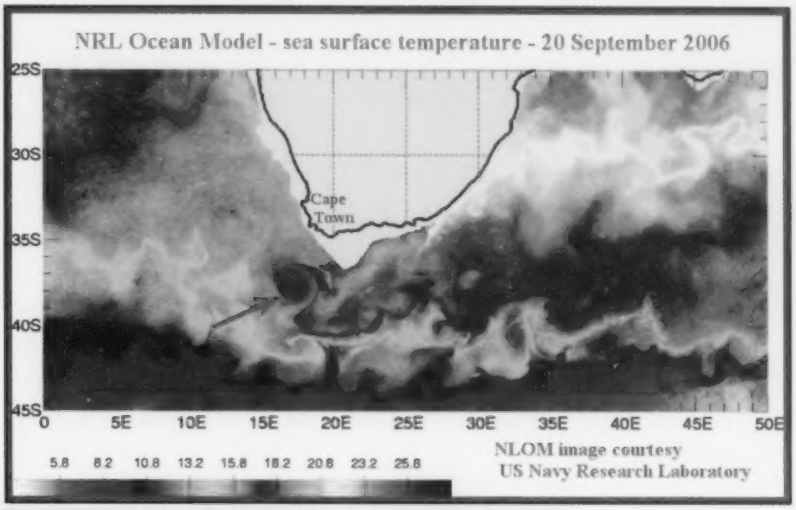
Surface drifters with onboard barometers and sea surface temperature sensors have been deployed for over two decades; whilst the profiling/subsurface float programs were only begun in earnest five to six years ago. One of the reasons behind the Argo float deployment program was the development of numerical models designed to predict (additional to the surface wind and sea state forecasts already available) sea temperature, salinity and ocean circulation throughout the water column.

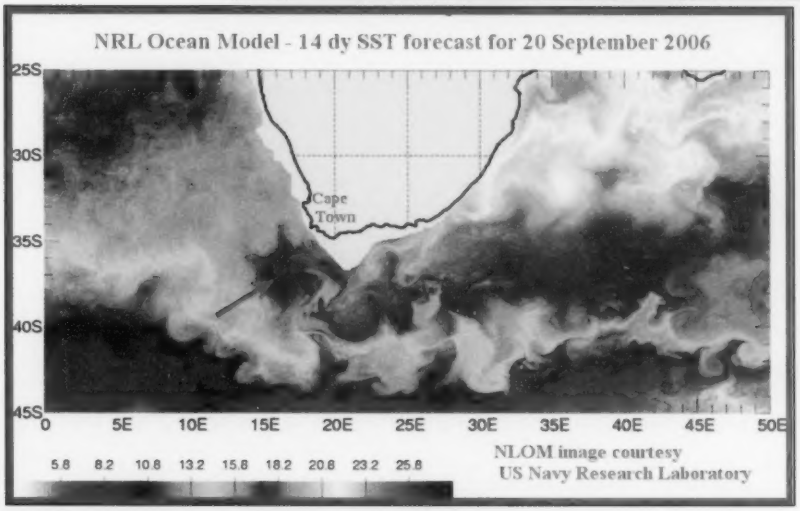
Consider the three images from the NLOM ocean prediction model, courtesy of the US Naval Research Laboratory: recent actual versus predicted surface circulation in South African waters. SST is not always a good indicator of ocean circulation. This is borne out by the way in which the eddy south-west of Cape Town is best captured in the last image i.e., ocean currents calculated from a combination of satellite-derived sea surface heights and the surface wind field. Currents around such eddies can be up to two kts, making information on the analysed/forecast position of these features particularly useful for slow-moving vessels, such as tugs with rigs/barges on tow.

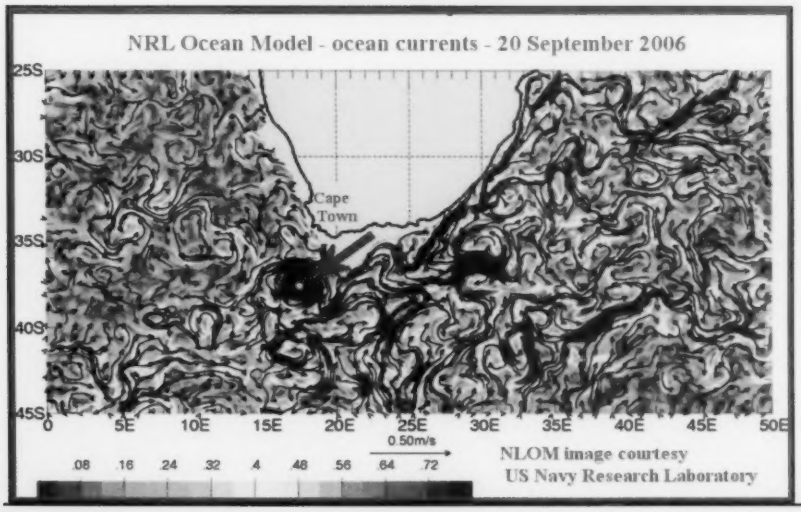


An Argo profiling float cycling through the water column.

Graphic courtesy of National Oceanographic Centre Southampton
http://www.soc.soton.ac.uk/JRD/HYDRO/argo/index.php







Three images from the NLOM ocean prediction model run by the US Navy Research Laboratory show the actual sea surface temperature (SST) on 20 September 2006, the 14-day forecast for that day, and the actual ocean surface currents calculated from satellite information.
Note that the model does not include the shallow waters of the continental shelves.

Similarly, in the Agulhas Current itself, vessels sailing south from Durban generally seek out the core of the Current to add several knots to their speed. However, current meter measurements have shown that the Agulhas Current can shift laterally over a 100 km seaward in a day due to the so-called 'Kwazulu Natal Pulse' propagating down the east coast. A high resolution ocean prediction model—which includes the continental shelf region—could provide useful information for both southbound and northbound vessels.

In all of these models—NWP, wave and ocean—continued improvements in accuracy rely on developments in the following areas :

- High resolution regional or even mesoscale models
- Further improvements in model physics
- More/ better input data, in-situ and remotely-sensed
- The use of 'ensembles' - where the model is run many times with slight adjustments to the initial analysis, so that probabilities may be linked to different forecast scenarios.

Whilst there are a great variety of ocean surface parameters being derived from satellites—and subsequently being fed into the various numerical prediction models—many of these satellites are not part of an operational "constellation." That is, there is no back-up should that particular satellite fail. Several of them have gone well beyond their designed life-time. This is obviously cause for concern as failure of a single satellite could significantly affect model performance.

As regards to in-situ data, recent statistics have shown that ocean data collection platforms providing barometric pressure data to the NWP models have increased steadily in number over the past few decades. However this is mainly due to increased numbers of drifting buoys. The number of Voluntary Observing Ship (VOS) reports globally have remained generally static, even decreasing at times.

The alternative of fitting vessels with automatic weather stations (AWS) has had limited impact. Installation can be a problem, e.g. many shipboard AWS do not have anemometers. Furthermore, important phenomena such as present weather (e.g. fog), sea state estimates, SST etc - are lost. This is the sort of information used by the marine forecaster to do an initial evaluation of the model prediction and to fine tune the short-term forecast.

Weather prediction began with the mariner. For over 150 years ships have been providing invaluable marine observations, and VOS databases continue to provide the basis for long-term metocean climatology. It is therefore fitting that the mariner should benefit from the new emphasis on operational ocean prediction.

It's "Eight Bells" for Longtime Marine Forecaster, Educator, and VOS Supporter, Lee Chesneau

Robert Luke, Voluntary Observing Ship Operations Manager, National Data Buoy Center

July 31, 2006 was the last day of weather watching through the porthole of the Ocean Prediction Center (OPC), just outside Washington, DC, for marine forecaster Lee Chesneau. Lee retired from government service with over 24 years between the U.S. Navy and NOAA. After successful tours onboard the **USS Saratoga** and the **USS Guam** during Vietnam, Lee was stationed at the Navy Weather Centers in Rota Spain and Norfolk, Virginia. Although Lee left active duty in 1979, he remained in the Naval Reserves. Lee joined NOAA in 1979 after working briefly as a ship router for OceanRoutes, Inc. He began his NOAA career in the satellite service, where he provided guidance on developing storms over the North Pacific in areas where there were no buoys and precious few ship observations. His next assignment was with the National Weather Service as a member of the Seattle Ocean Services Unit in 1983. He then joined the Ocean Prediction Center (formerly the Marine Prediction Center) in 1989, where he remained until retirement.

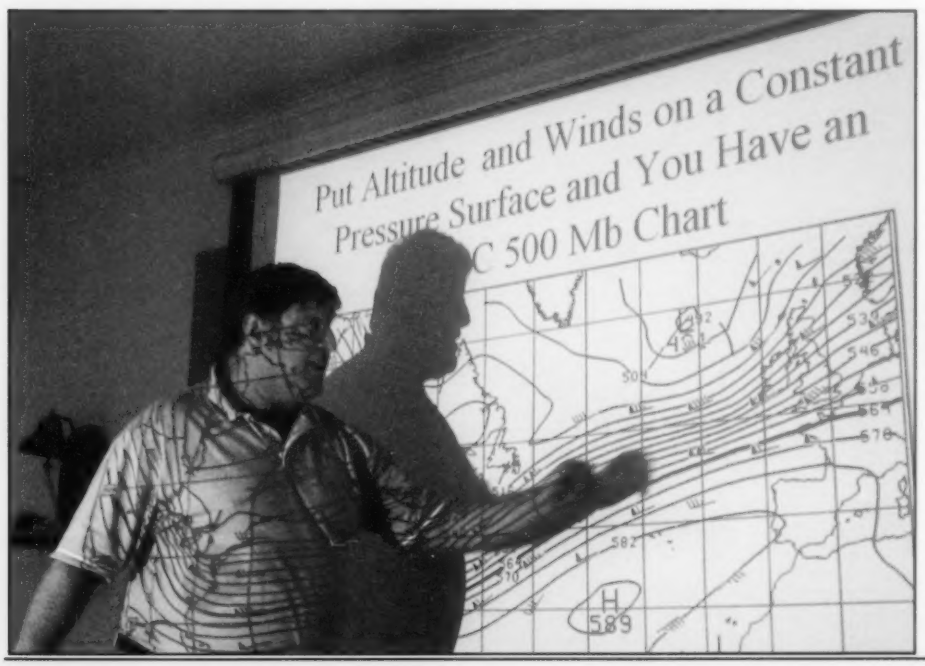
During his time with the OPC, many mariners have gotten to know Lee from his marine weather training and Heavy Weather Avoidance classes, taught in conjunction with the Maritime Institute of Technology and Graduate Studies, and from his well received talks at numerous boat shows. Lee is only one of a few people across the nation who has been certified as an USCG Standard Training, Certification, and Watch Standing (STCW) Instructor for basic and advanced meteorology.

The VOS program, especially the Mariners Weather Log, holds Lee in high regard. Lee has authored or co-authored numerous MWL classics, such as "Hurricane Avoidance Using the 34 Knot Wind Radius and 1-2-3 Rules (1999)" and the heralded "Mariner's Guide to the 500-Mb Chart (1995)."

In his retirement, Lee expects to continue serving the marine community through training and education efforts in the private sector. For more information, please visit his web site at www.chesneaumaineweather.com

Carr, M., G. Burkley, and L. Chesneau, 1999: Mariners Weather Log, Aug. 1999, 4-6

Sienkiewicz, J. and Chesneau, L., 1995: Mariners Weather Log, Winter 1995.



Fair winds friend, and good luck on all your upcoming adventures over the horizon. Luke

Marine Weather Review—North Atlantic Area May through August 2006

By George P. Bancroft, NOAA National Center for Environmental Prediction

Introduction

The May to August period is the least active of the four-month periods for non-tropical weather systems. The current period featured developing low-pressure systems moving off the U.S. coast or Canadian Maritime Provinces, with the strengthening of the Bermuda-Azores High favoring a more northern storm track as the summer progressed. Some of these lows developed storm-force winds during May and early June, mainly over the eastern North Atlantic and later in the Greenland-Iceland area and northeast Atlantic, with August being least active.

The tropical cyclones Alberto, Beryl, Debby and Ernesto affected parts of OPC's southern waters during the period from the middle of June on. None of these became hurricanes in OPC's waters, but Ernesto came close late in August off the southeast U.S. coast, and Alberto developed hurricane-force winds after becoming extratropical, off the northeast U.S. coast in mid-June.

Tropical Activity

Tropical Depression Alberto: The first tropical cyclone of the Atlantic season, Alberto made landfall as a tropical storm on the Florida panhandle on the afternoon of June 13, weakened to a tropical depression over the Carolinas before becoming extratropical on the 14th. The remains of Alberto then redeveloped explosively as an extratropical hurricane-force storm as depicted in ***Figure 1***, with the central pressure dropping an impressive 32 hPa in the twenty-four

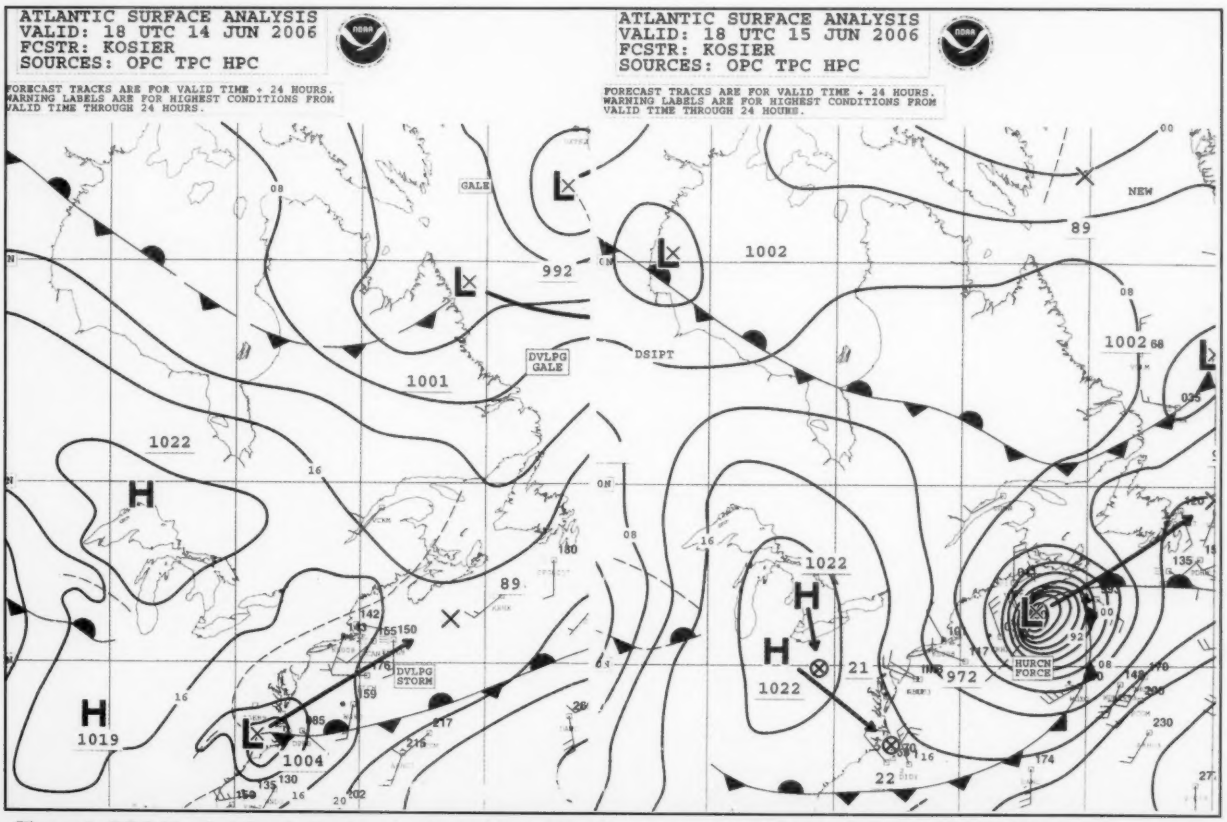


Figure 1. OPC North Atlantic Surface Analysis charts (Part 2 - west) valid 1800 UTC June 14 and 15, 2006, showing rapid intensification of the remains of Tropical Depression Alberto.

period ending at 1800 UTC June 15, a deepening rate more typical of intense winter cyclones. The sharp 500 hPa short-wave trough leaving the coast (***Figure 2***), the tropical origin and the fact that there were no other competing lows in the area likely contributed to this robust redevelopment of the remains of Alberto. For more information on the use of the 500-MB chart and the relationship between features at 500 MB and the surface see Reference 2. The cyclone appears at peak intensity in the second part of ***Figure 1***, as a compact hurricane-force low. While Alberto was still inland and before extratropical transition, the Navy platform SPAG1 (31.4N 80.5W) reported a south wind of 37 kts with gusts to 43 kts at 0600 UTC June 14. Folly Island C/MAN station (32.7N 79.8W) reported a southwest wind of 31 kts with peak gusts 42 kts at 1000 UTC June 14. The buoy 41008 (31.4N 80.9W) had south winds of 31 kts with gusts to 39 kts and 2.5 m seas (8 ft) at 0200 UTC on the 14th. Seas reached 3.0 m (10 ft) three hours prior, and a peak gust of 43 kts came one hour later, at that

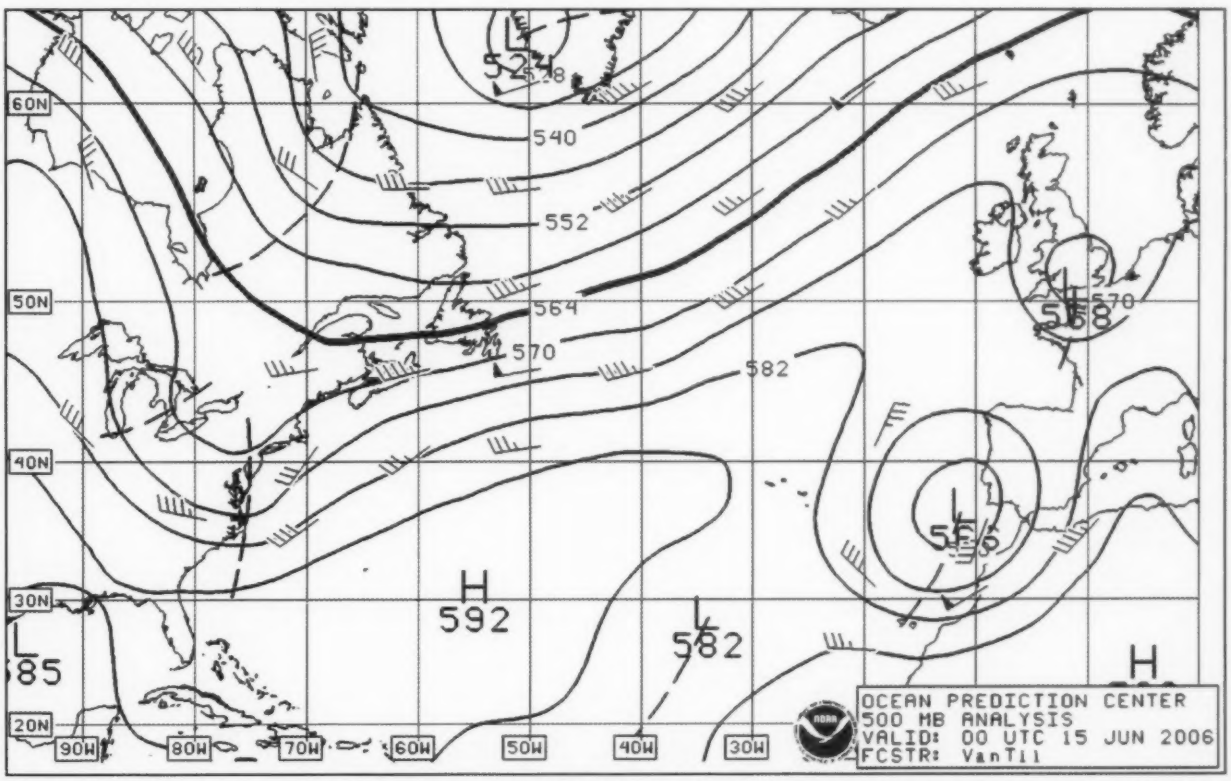


Figure 2. OPC North Atlantic 500-MB Analysis, valid 0000 UTC June 15, 2006. The chart is computer-generated with short-wave troughs (dashed lines) added manually.

buoy. Other observations taken after Alberto became extratropical are listed in ***Table 1***. Remotely-sensed wind data such as QuikScat was available during the storm but missed the highest winds of the storm, but peak gusts were 66 kts at Buoy 44011 shortly after the storm center passed with buoys tending to underestimate winds. The cyclone began to weaken late on the 15th and moved across the island of Newfoundland as a gale on June 16, eventually crossing the British Isles late on the 18th.

Tropical Storm Beryl: Tropical Depression Two formed off the southeast U.S. coast near 32N 73W on the morning of July 18, becoming Tropical Storm Beryl six hours later while moving north, with maximum sustained winds of 35 kts and gusts to 45 kts. Beryl maintained this intensity through the following night before intensifying (***Figure 3***). Beryl attained peak intensity the next afternoon east of Cape Hatteras with maximum sustained winds 50 kts with gusts to 60 kts. The ship **Auguste Oldendorff** (A8HK4) (34N 72W) reported south winds of 30 kts at 0600 UTC on the 19th. The buoy 41001 (34.7N 72.7W) reported south winds 29 kts with gusts to 37 kts and 4.0 m seas (13 ft) at 1000 UTC July 19. At 0000 UTC July 20 the **DSR Port Said** (ELTY2) encountered east winds of 35 kts near 38N 72W. An aproaching cold front (***Figure 3***) turned Beryl toward the northeast late on the 20th, with the center passing near Nantucket early on the 21st. The buoy 44008 (40.5N 69.4W) reported southwest winds of

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEAS(m/ft)
APL New York (A8GS3)	35N 73W	15/0600	NW 36	
Lykes Discoverer (WGXO)	38N 66W	15/0600	S 45	
Rickmers Singapore (V7EE5)	43N 65W	15/1800	NW 50	5.0/16
Buoy 41013	33.4N 77.7W	14/1800	SW 35 G43	4.5/15
		14/1900	peak gust 51	
Buoy 41025	35.0N 75.4W	15/0000	NW 39 G49	3.0/10
			peak gust 54	
		15/0100		maximum 4.0/13
Buoy 41001	34.7N 72.7W	15/0200	SW 37 G49	6.0/20
Buoy 44008	40.5N 69.4W	15/1000	NW 29 G35	2.5/8
			peak gust 49	
Buoy 44011	41.1N 66.6W	15/1600	NW 41 G52	7.0/23
			peak gust 66	
		15/1300	sea level pressure 978.0 mb	
Buoy 44141	42.1N 56.2W	16/0200	SW 49 G62	8.5/28
		16/0300		maximum 11.0/36
Buoy 44137	42.3N 62.0W	15/1900	S 45	8.5/28
		15/2100	SW 35	11.5/37
Duck Pier (DUCN7)	36.2N 75.7W	14/2300	NE 31 G35	
			peak gust 55	
Chesapeake Light (CHLV2)	36.9N 75.6W	14/2100	NE 36 G41	
		14/2200	peak gust 48	
Platform VEP717	46.7N 48.7W	16/1500	S 50	

Table 1. Ship, buoy and coastal C/MAN station observations taken during redevelopment of Alberto as an intense extratropical low.

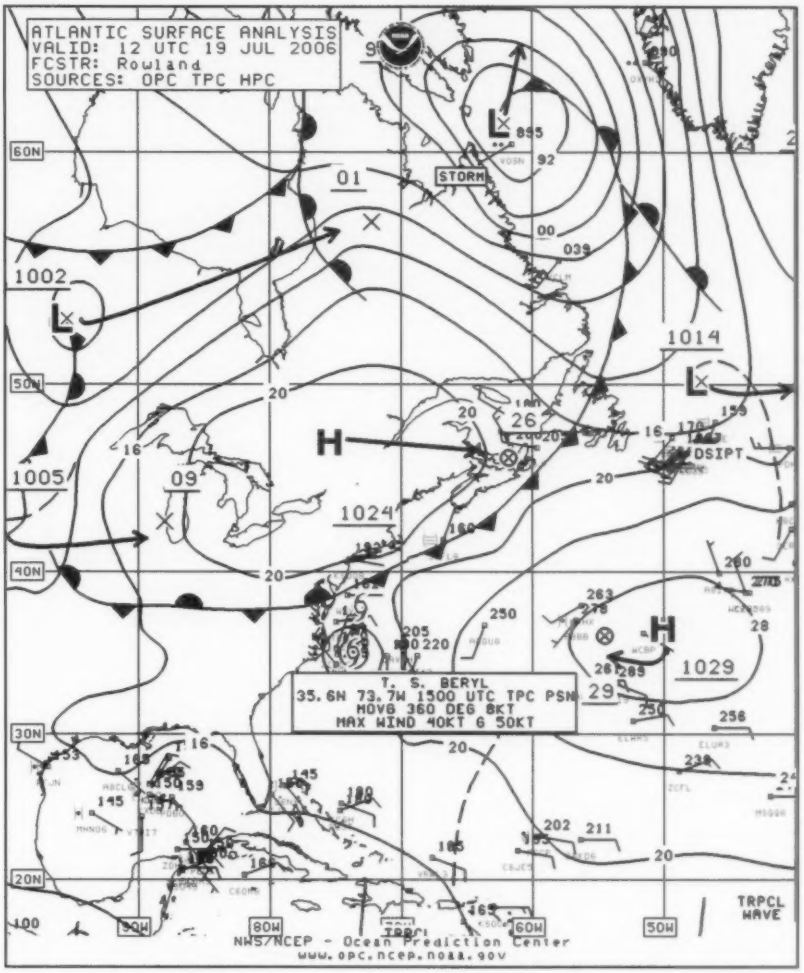


Figure 3. OPC North Atlantic Surface Analysis chart (Part 2) valid 1200 UTC July 19, 2006.

35 kts with peak gusts 49 kts and seas reaching 6.0 m (20 ft) at 0700 UTC July 21, the highest conditions reported during this event. Beryl weakened to an extratropical gale in the Gulf of Maine by the afternoon of the 21st, passed northeast of the island of Newfoundland on July 22, and then turned southeast, dissipating near the Azores on the 25th.

Tropical Depression Debby: Debby moved north into OPC's high seas waters on the afternoon of August 27 as a weakening tropical depression, appearing in the first part of ***Figure 8*** (see page 28) as the 1012 hPa low near 31N 49W. Maximum sustained winds were 25 kts with gusts to 35 kts. Debby became extratropical that evening and was absorbed by the frontal system to the northwest early on the 28th.

Tropical Storm Ernesto: Ernesto moved north into OPC's far southwest offshore waters on the morning of August 31 with maximum sustained winds of 50 kts with gusts to 60 kts. The cyclone then approached hurricane strength before moving onshore near Cape Fear on the evening of August 31 (***Figure 4***). Some selected observations taken during passage of Ernesto on the 31st and on the following night are listed in ***Table 2***.

Other Significant Events of the Period

Eastern North Atlantic Storm, May 1–3: The development of this intense low is shown in ***Figure 5***, with much of the intensification occurring in the twenty-four hour period covered in the figure. The central pressure dropped an impressive 36 hPa during this period, the highest of the four-month period for any system in both the North Atlantic and North Pacific. The central pressure bottomed out at 966 hPa twelve hours later, making this cyclone the deepest of the period in both oceans. Winds reached storm

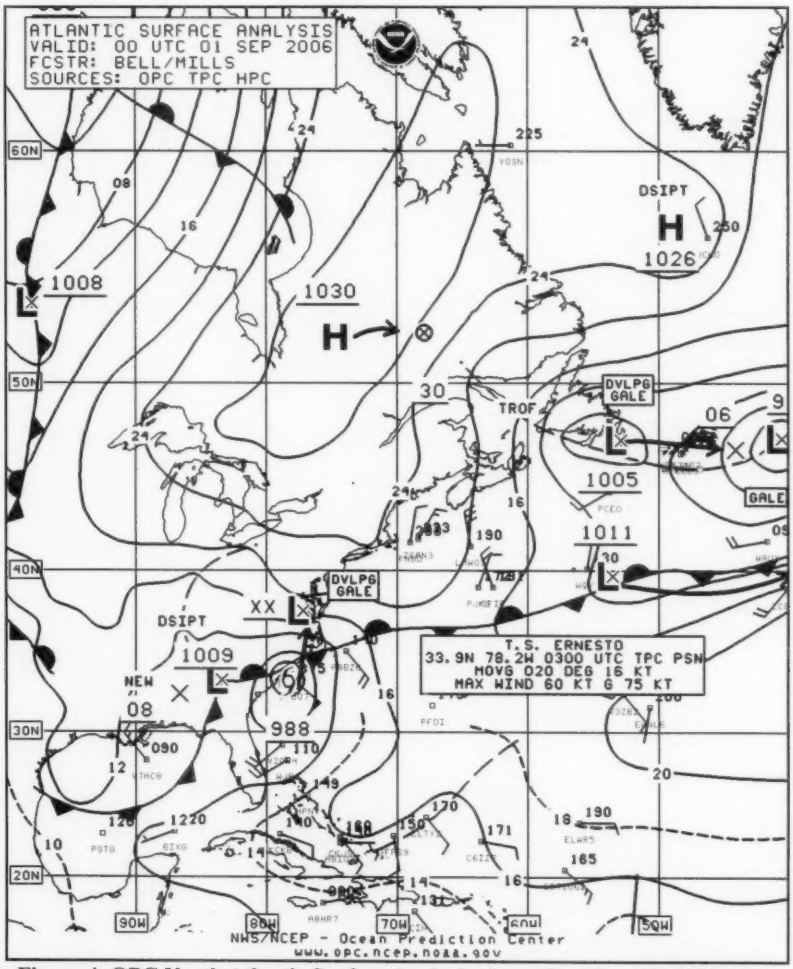


Figure 4. OPC North Atlantic Surface Analysis chart (Part 2) valid 0000 UTC September 1, 2006.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEAS(m/ft)
Maersk Vermont (WAUW)	32.5N 76W	31/2100	SE 30	6.0/20
British Trader (ZIPR7)	36N 73.5W	01/1200	SE 50	5.0/17
Buoy 41004	32.5N 79.1W	31/2200	NW 39 G49	
		31/2300	peak gust 54	
		31/1900		maximum 4.0/13
Buoy 41013	33.4N 77.7W	01/0100	SE 45 G56	6.5/21
		01/0200	peak gust 58	
Buoy 44014	36.6N 74.8W	01/0200	NE 29 G35	3.0/10
		01/1900		maximum 5.0/16
Cape Lookout (CLKN7)	34.6N 76.4W	01/0700	SE 38 G46	
		01/0300	peak gust 55	
Chesapeake Light (CHLV2)	36.9N 75.6W	01/0800	E 42 G51	
		01/1800	peak gust SE 56	

Table 2. Ship, buoy and coastal C/MAN station observations taken during passage of Tropical Storm Ernesto

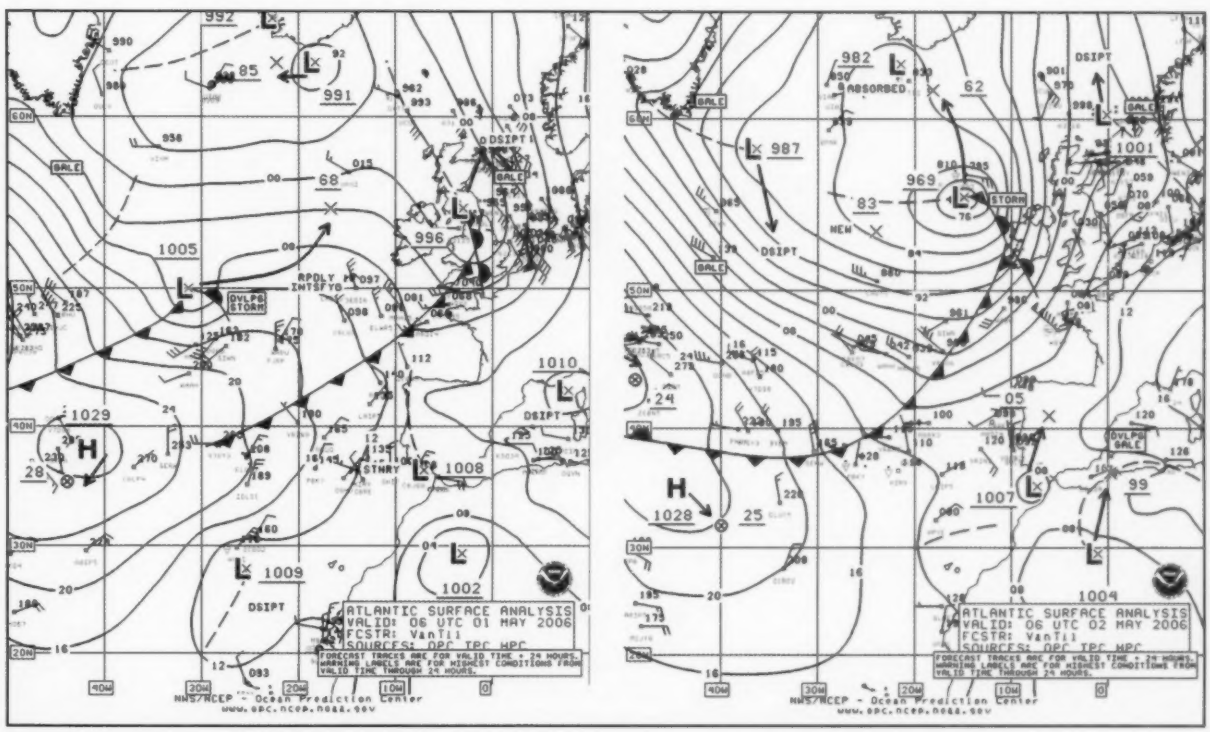


Figure 5. OPC North Atlantic Surface Analysis charts (Part 1 - east) valid 0600 UTC May 1 and 2, 2006.

force as revealed in the QuikScat image of ***Figure 6***, up to 55 kts south of the center, in the absence of conventional observations. Although this system was deeper than the remains of Alberto, it was not as compact, had a larger circulation, and the winds were not as strong. The storm subsequently turned northwest on May 3 and began to weaken, becoming a gale near 61N 34W early on the 4th, and dissipating southeast of Greenland on the 5th.

Eastern North Atlantic Storms, May 19–21: Two cyclones followed in close succession later in the month, with the stronger one being the second storm. The first originated near the Labrador coast early on May 17 and tracked east-southeast across the Atlantic, briefly intensifying to a 983 hPa storm-force low just west of the British Isles at 1200 UTC May 19. The first part of ***Figure 7*** shows this system crossing the British Isles as a weakening gale, while the second system is over the central waters. The second part of ***Figure 7*** shows the second storm at peak intensity west of France, with a ship **Cap Nelson** (A8EG8) with a northwest wind 55 kts plotted. The cyclone then weakened while crossing Great Britain on the 22nd, and passed inland over Norway early on May 23.

Eastern North Atlantic Storm, June 10–11: This storm originated as a frontal wave of low pressure southeast of Newfoundland late on June 7 and tracked east-northeast across the Atlantic, before turning more north off the coast of France with a double center on the 10th. The ship **Emden** (3ERP5) (46N 30W) encountered north winds of 40 kts and 6.5 m seas (22 ft) at 0600 UTC on June 9. The

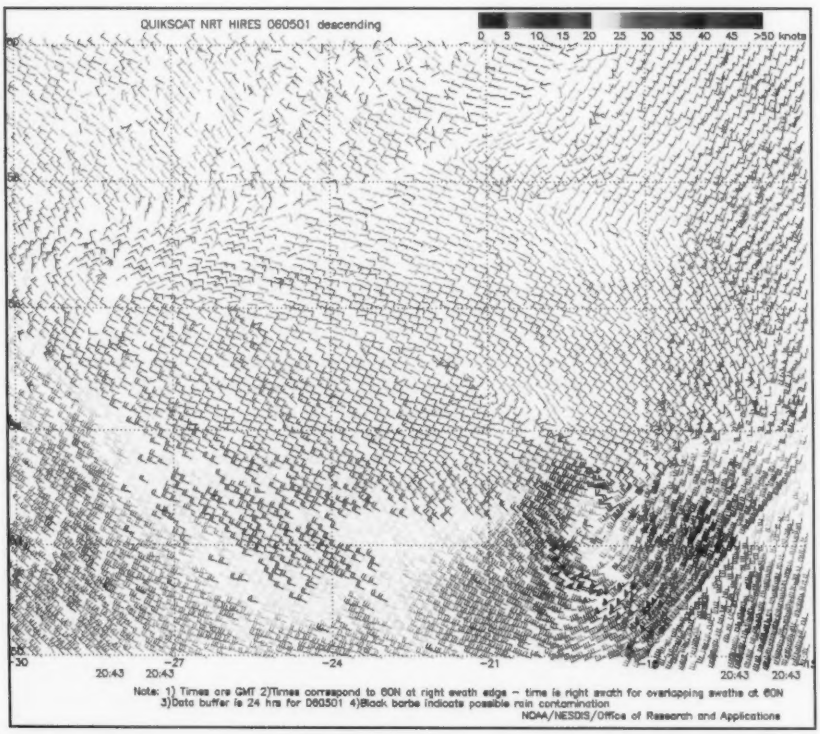

QUIKSCAT NRT HIRES 060501 descending
0 5 10 15 20 25 30 35 40 45 >50 knots
-30
20:43
20:43
-27
-24
-21
20:43
20:43
Note: 1) Times are GMT 2)Times correspond to 60N at right swath edge – time is right swath for overlapping swaths at 60N
3)Data buffer is 24 hrs for 060501 4)Black barbs indicate possible rain contamination
NOAA/NESDIS/Office of Research and Applications

Figure 6. High-resolution QuikScat scatterometer image of satellite-sensed winds around the storm shown in Figure 5. The resolution is 12.5 km, versus 25 km in the coarser version of such imagery. The valid time of the pass is 2043 UTC May 1, 2006, or about nine hours prior to the valid time of the second part of *Figure 5*. The center of the storm's circulation appears near 53N 19W in the lower right side of the image.

Image is courtesy of NOAA/NESDIS/Office of Research and Applications.

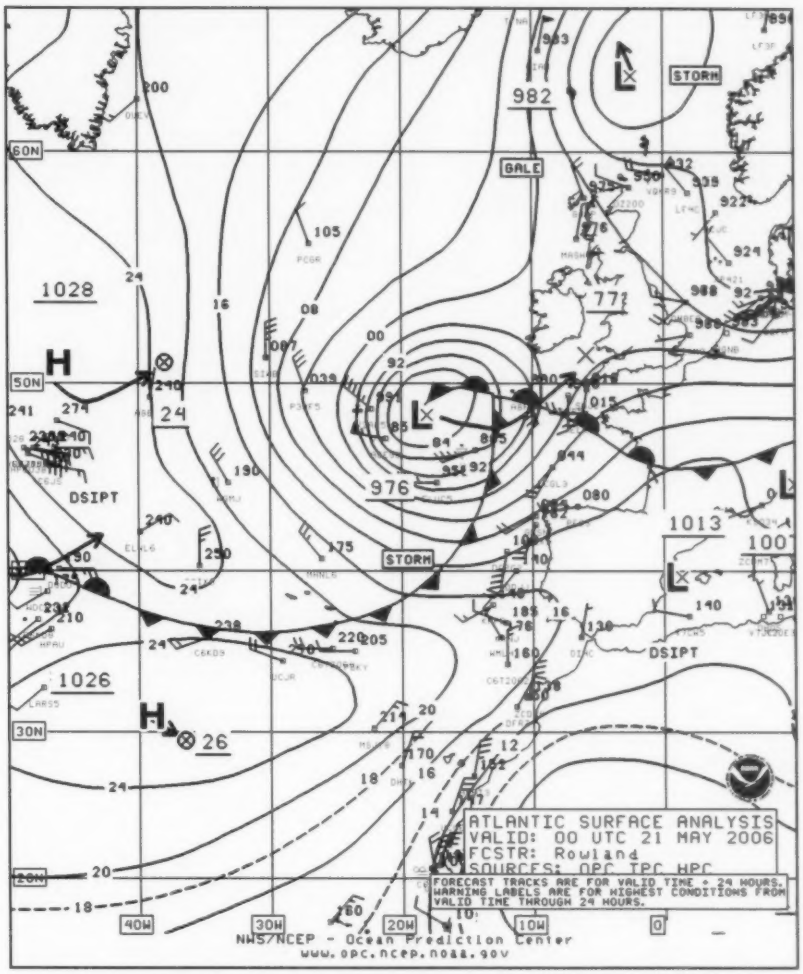


Figure 7. OPC North Atlantic Surface Analysis charts (Part 1) valid 0000 UTC May 20 and 21, 2006.

main center passed near 53N 19W with a 985 hPa central pressure at 1800 UTC June 10, when the **Atlantic Compass** (SKUN) reported a west wind of 60 kts. A high-resolution QuikScat pass two hours later showed winds mainly minimal storm-force on the southeast side of the center. The center deepened to 980 hPa while passing 400 nmi west of Ireland early on June 11, before beginning to weaken. The cyclone passed east of Iceland as a gale on the 13th.

Northeast Atlantic Storm, June 29: This was a cyclone of similar intensity to the one described in the preceding paragraph, originating as a frontal wave of low pressure near 52N 33W early on June 27. The developing cyclone then absorbed two other lows to the north and developed a central pressure down to 983 hPa about 250 nmi southwest of Iceland at 1800 UTC on the 29th. High-resolution scatterometer imagery was available in an area of sparse ship data nine hours prior to this, revealing several 50 kts wind barbs south of the storm center. The cyclone then weakened to a gale, passing across Iceland late on the 30th.

North Atlantic Storm, July 10–12: Subsequent significant low-pressure systems occurring in July affected mainly the far northern waters, with the progression of the season into mid-summer, usually the least active period of the year. The first one moved off the Labrador coast on July 9 and intensified to a storm near Cape Farewell twenty-four hours later. The vessel **Bruarfoss** (V2PS8) encountered southwest winds of 50 kts near

58N 34W at 0600 UTC on the 11th, while the storm center was passing 250 nmi to the north. High-resolution QuikScat data available near this time showed winds to 55 kts on the south side of the center, similar to ***Figure 6***. The center developed a lowest central pressure of 977 hPa six hours later as it approached Iceland. The ship **Vega** (UHOM) reported west winds of 45 kts near 60N 29W at 1800 UTC July 11. At 1600 UTC July 12, after the weakening system had passed northeast of Iceland, the buoy 64046 (60.7N 4.7W) reported southwest winds of 25 kts and 7.5 m seas (25 ft).

Northwest Atlantic Storm of July 19–20: This short-lived event affected mainly the Davis Strait area. While Tropical Storm Beryl was off the U.S. coast, low pressure moved from Labrador north into the Davis Strait (***Figure 3***). Winds reached marginal storm strength off the west coast of Greenland on the 19th as revealed in high-resolution scatterometer data (not shown). The **Irena Arctica** (OXTS2) reported southeast winds of 40 kts near 61N 49W at 0000 UTC on the 20th. The system weakened while passing through the Davis Strait early on the 20th.

North Atantic Storm of July 26–27: A gale-force low moved northeast from the island of Newfoundland at 0600 UTC July 25 with much of the deepening (20 hPa) occurring in the

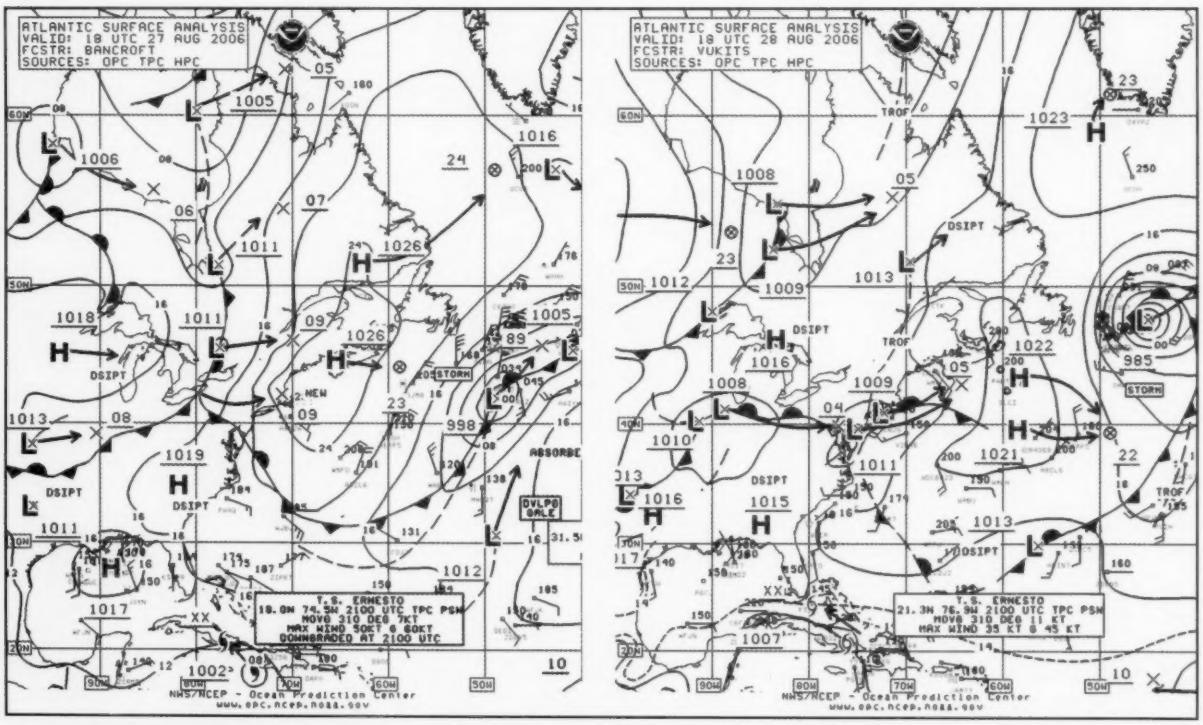

ATLANTIC SURFACE ANALYSIS
VALID: 18 UTC 27 AUG 2006
FCSTR: BANCROFT
SOURCES: OPC TPC HPC
T.S. ERNESTO
18.0N 74.5W 2100 UTC TPC PSN
MOVE 310 DEG 7KT
MAX WIND 50KT G 60KT
DOWNGRADED AT 2100 UTC
NWS/NCEP - Ocean Prediction Center
www.opc.ncep.noaa.gov
ATLANTIC SURFACE ANALYSIS
VALID: 18 UTC 28 AUG 2006
FCSTR: VUKITS
SOURCES: OPC TPC HPC
T.S. ERNESTO
21.3N 76.9W 2100 UTC TPC PSN
MOVE 310 DEG 11 KT
MAX WIND 35 KT G 45 KT
NWS/NCEP - Ocean Prediction Center
www.opc.ncep.noaa.gov

Figure 8. OPC North Atlantic Surface Analysis charts (Part 2) valid 1800 UTC August 27 and 28, 2006.

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEAS(m/ft)
Bonn Express (DGNB)	44N 48W	27/2000	NE 51	
SHIP	48N 48W	28/1200	N 50	
Maersk Damascus (DAWC)	44N 48W	28/1800	W 25	10.5/35
Marseille Star (9HCH7)	51N 44W	28/1800	NE 30	8.5/28
Rowan Gorilla VI (WCZ6545)	47N 48W	28/2100	NW 55	
Platform (C6QE7)49.4N 48W		28/1800	N 60	
Platform (YJUF7)	6.7N 48W	28/1800	W 62	
		28/2100	W 66	
Platform (VEP717)	6.7N 48.7W	8/2100	W 55	
		29/0600	W 40.	5/22
Hibernia Platform (HP6038)	6.4N 48.4W	8/2100	W 55	
		29/0000	W 55	

Table 3. Selected observations from ships and Grand Banks oil platforms taken during the storm of August 27–29.

first twenty-four hours. The cyclone developed a central pressure as low as 975 hPa near 58N 31W at 0600 UTC on the 27th, with the system stalling. The ship **Gemma** (UCFT) (57N 33W) encountered southwest winds of 50 kts twelve hours prior to this. QuikScat imagery also showed winds to 50 kts. The cyclone then began a southeastward drift and weakened to a gale on the 27th, before passing east across northern Great Britain by August 1.

North Atlantic Storm, August 27–29: This cyclone developed from a complex multi-centered weak low near 40N 52W at 0000 UTC August 27 and moved northeast, initially developing storm-force winds eighteen hours later as shown in the first part of ***Figure 8***. The system then consolidated into a compact storm as shown in the second part of the figure. ***Table 3*** lists reports from ships and oil platforms in the area. Although some of the oil platform reports are elevated and tend to report a bit high, especially in summer, available QuikScat data showed winds as high as 60 kts. The cyclone then continued to move northeast and began to weaken on the 29th, becoming a gale over the central North Atlantic by August 30.

References

1. From Tropical Prediction Center website, http://www.nhc.noaa.gov/aboutsshs.shtml.

2. Sienkiewicz, J. and Chesneau, L., Mariner's Guide to the 500-Mb Chart (Mariners Weather Log, Winter 1995).

Marine Weather Review—North Pacific Area May through August 2006

By George P. Bancroft, NOAA National Center for Environmental Prediction

Introduction

The weather pattern over the North Pacific remained rather active from May into early June when most of the cyclonic systems strong enough to produce storm-force winds occurred. There was a hurricane-force storm in the western Pacific east of Japan in early June, a very unseasonable event that stood out as the most significant non-tropical event of the period. From the middle of June through August OPC analyzed no non-tropical storm-force lows, a period that normally has declining activity going into mid-summer. Cyclonic activity usually picks up in August, but this year August was without any storm-force lows.

Tropical activity in the western Pacific was concentrated in the month of August, during which five named tropical cyclones appeared on OPC's oceanic analysis charts used for radiofacsimile transmission. These headed in the direction of Japan and either passed south of Japan or turned north and weakened near Japan or the Kurile Islands. Three tropical cyclones were typhoons, including Super Typhoon Ioke which came from the central Pacific at the end of August. No tropical systems redeveloped into intense lows after becoming extratropical during this period.

Tropical Activity

Typhoon Maria: Tropical Storm Maria formed near 26N 145E at 1200 UTC August 5 with 35 kts maximum sustained winds. Six hours later the **Maersk Wind** (S6TY) near 27N 143E reported east winds of 50 kts. The cyclone intensified while tracking northwest, briefly becoming a typhoon near 31N 137E, south of Japan, at 1200 UTC August 7 with maximum sustained winds of 65 kts with gusts to 80 kts. Maria then weakened while turning to the north and then northeast, becoming a tropical storm with maximum sustained winds 45 kts with gusts to 55 kts while passing near 34N 137E at 1200 UTC on the 8th. The ship **British Confidence** (MLJA8) (33N 138E) just southeast of the center encountered south winds of 50 kts at that time. Maria then became an extratropical gale 35N 141E with a 1000 hPa central pressure, just east of Tokyo, at 0000 UTC August 9. Maria's extratropical remains then moved northeast, before turning north along 150E and weakening near the Kurile islands on the 13th.

Typhoon Saomai: ***Figure 1*** shows Typhoon Saomai just entering OPC's oceanic chart area at 1200 UTC August 6, along with Tropical Storm Maria to the north. Saomai had just been upgraded to a typhoon by Joint Typhoon Warning Center near Honolulu. Saomai then moved to near 18N 139E with maximum sustained winds 75 kts with gusts to 90 kts twelve hours later, and maintained this intensity until the cyclone passed west of the area about 250 nmi south of Japan late on the 7th, where further intensification occurred.

Tropical Storm Wukong: Tropical Depression 11W formed southeast of Japan near 22N 141E at 1200 UTC August 12 and, like its predecessors moved northwest initially. Maximum sustained winds were initially 25 kts with gusts to 35 kts. The cyclone intensified to a tropical storm near 25N 139E at 0000 UTC on the 13th, with the Japanese Meteorological Agency naming it Wukong six hours later. Maximum sustained winds were 35 kts with gusts to 45 kts. The ship (name unknown) (ZOYC5) (29N 139E) reported east winds of 35 kts at 1200 UTC August 13. Wukong slowly intensified while turning toward the north, attaining maximum strength near 27N 138E at 1800 UTC on the 14th with sustained winds to 50 kts and gusts to 65 kts. The cyclone then turned to the northwest and then west, passing west of the area about 300 nmi south of Japan on August 16, where it slowly weakened.

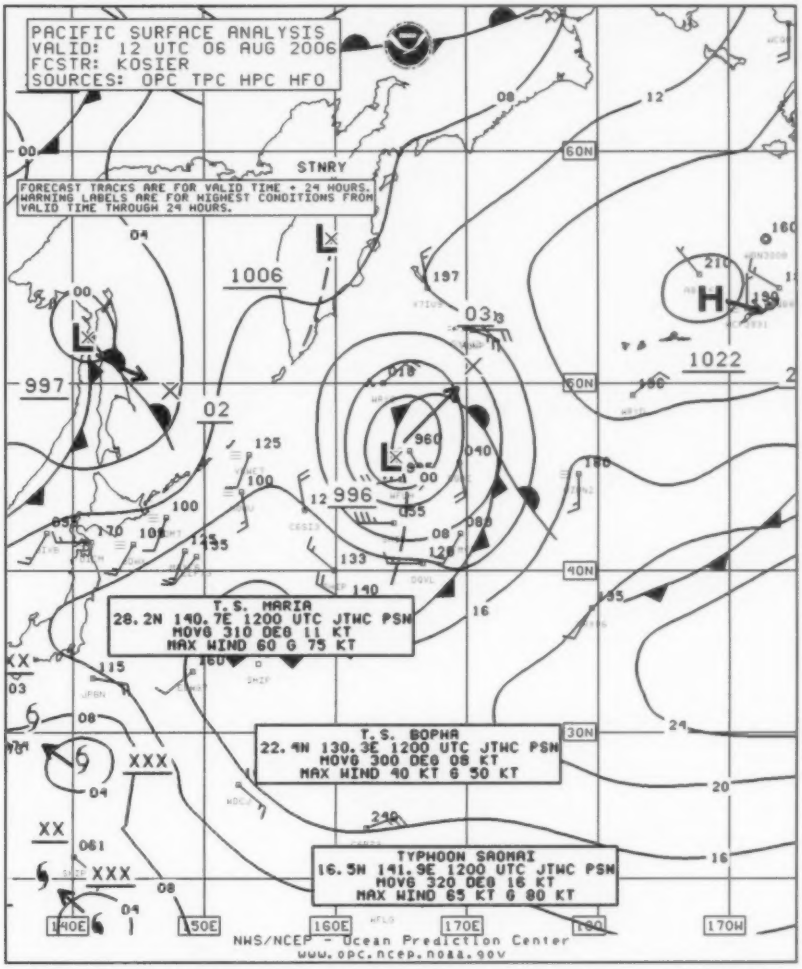


Figure 1. OPC North Pacific Surface Analysis chart (Part 2 – west) valid 1200 UTC August 6, 2006.

Tropical Storm Sonamu: While Wukong was about 400 nmi south of Japan, Tropical Storm Sonamu moved northeast into OPC's oceanic map area near 21N 136E by 0000 UTC August 15 with maximum sustained winds of 45 kts with gusts to 55 kts. The cyclone weakened to a tropical depression while passing near 26N 140E eighteen hours later, before dissipating 250 nmi south of Tokyo late on August 15.

Super Typhoon Ioke: Ioke was formerly Hurricane Ioke in the central Pacific up until early on August 27 when it crossed 180W and the Joint Typhoon Warning Center named it Super Typhoon Ioke, a special warning classification for storms with maximum sustained winds 130 kt or higher. At 1200 UTC August 27 Ioke was at maximum strength, located near 17N 179E with maximum sustained winds of 140 kts with gusts to 170 kts. This intensity would rate as Category 5, highest on the Saffir-Simpson intensity scale (See Reference 1). Ioke then tracked west between 16N and 17N until beginning a turn toward the northwest and crossing 170E early on the 30th. At the end of August Ioke passed near 20N 165E, still a super typhoon with maximum sustained winds of 135 kts and gusts to 165 kts. Ioke's long history continued into September and more information on this storm will be found in the next issue of Mariners Weather Log.

Other Significant Events

North Pacific Storm, May 1–3: The relatively active month of May began with a storm center moving along 40N and approaching the dateline as shown in ***Figure 2***. The cyclone moved east and weakened to a gale at 0000 UTC May 2, before turning northeast and re-intensifying into a storm-force low as shown in the second part of ***Figure 2***, with the cyclone at maximum intensity in terms of central pressure. As for winds with this system, high-resolution QuikScat satellite-derived winds with this system were actually a little higher when the center was near or south of 40N, with ***Figure 3*** revealing a swath of north winds of 50 to 55 kts on the back side of the storm center. The time of this image is less than 5 hours earlier than the chart time of the first part of ***Figure 2***. Ship reports were sparse, not exceeding 35 kts. The cyclone then weakened while continuing to move northeast, dissipating near the south coast of mainland Alaska late on May 4.

North Pacific Storm, May 3–19: As depicted in ***Figure 4***, a complex system with several centers scattered between 30N and 52N consolidated into a single 978 hPa cyclone in the twenty-four hour period ending at 1800 UTC on the 3rd , when much of the intensification occurred. At 0000 UTC on the 4th, the **APL Korea** (WCX8883) near 51N 168E reported east winds of 55 kts north of the center. Six hours later the **Newport Bay** (MQEC7) encountered west winds of 45 kts near 44N 174E. The cyclone developed a lowest central pressure of

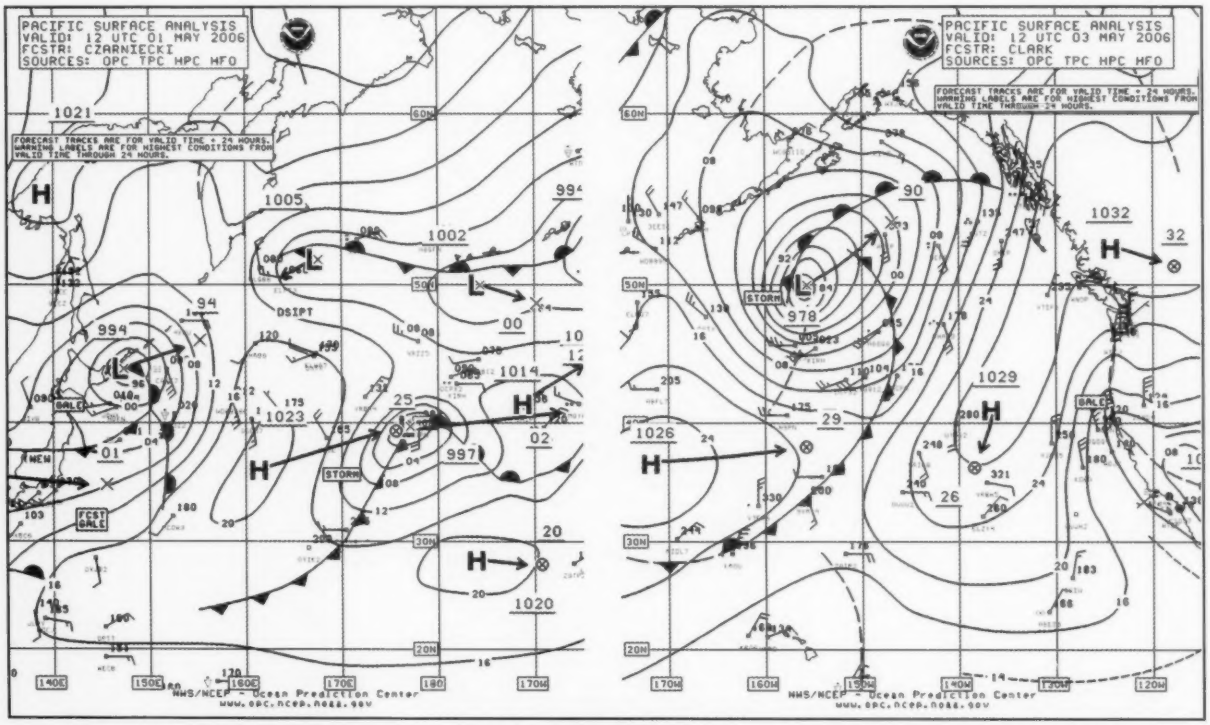


Figure 2. OPC North Pacific Surface Analysis charts valid 1200 UTC May 1 (Part 2 - west) and 1200 UTC May 3 (Part 1–east), 2006.

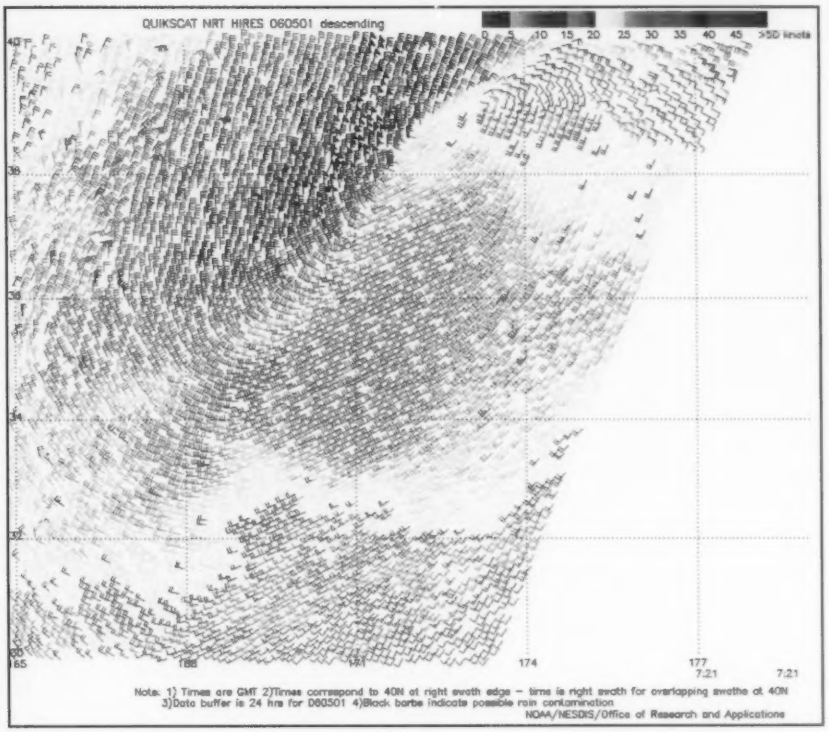

QUIKSCAT NRT HIRES 060501 descending
0 5 10 15 20 25 30 35 40 45 >50 knots
Note: 1) Times are GMT 2)Times correspond to 40N at right swath edge – time is right swath for overlapping swaths at 40N
3)Data buffer is 24 hrs for 060501 4)Black barbs indicate possible rain contamination
NOAA/NESDIS/Office of Research and Applications

Figure 3. High-resolution QuikScat scatterometer image of satellite-sensed winds around the storm shown in the first part of *Figure 2*, valid at 0721 UTC May 1, 2006, or less than five hours prior to the valid time of the first part of *Figure 2*. The resolution is 12.5 km, versus 25 km in the coarser version of the imagery. The center of the storm appears near 39N 173E.

Image is courtesy of NOAA/NESDIS /Office of Research and Applications.

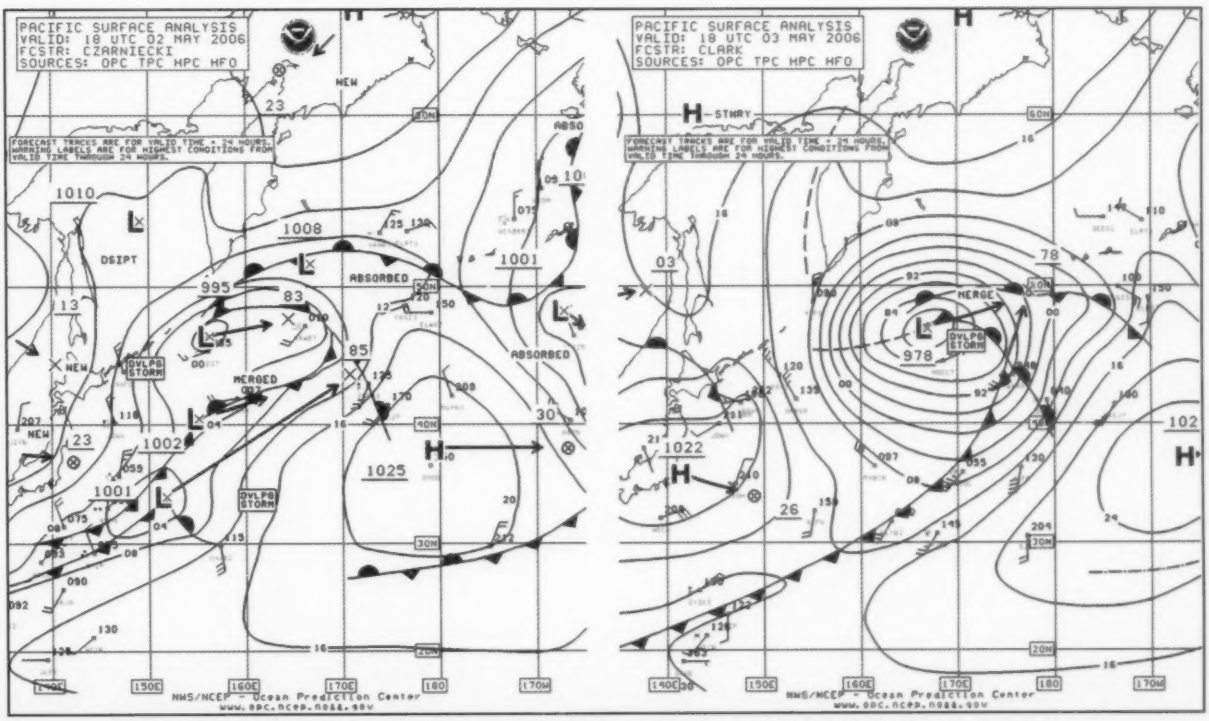


Figure 4. OPC North Pacific Surface Analysis charts (Part 2) valid 1800 UTC May 2 and 3, 2006.

970 hPa near 51N 180W at 1800 UTC May 4, the lowest pressure attained by a non-tropical system in the North Pacific during the four-month period. The storm system subsequently reformed to the northeast and weakened to a gale near the Alaska Peninsula early on the 5th, before dissipating in the northern Gulf of Alaska late on May 7.

Northwest Pacific and Bering Sea Storm, May 14–15: A developing storm tracked northeast into the western Bering Sea as depicted in the two parts of ***Figure 5***. The system developed storm force winds by 1800 UTC May 14, which continued until the cyclone weakened in the northwest Bering Sea late on the 15th. The ship **Vincent Thomas Bridge** (H3WJ) (44N 159E) reported southwest winds of 45 kts at 1800 UTC on the 14th, the highest wind from conventional observations. A high-resolution scatterometer pass (***Figure 6***) reveals winds as high as 55 kts in westerly flow south of the storm center, and southeast winds as high as 50 kts in the southern Bering Sea associated with the front. The second part of ***Figure 5*** shows the storm at maximum intensity. The cyclone then weakened slowly while drifting through the northern Bering Sea from late on the 15th through the 18th, before dissipating on May 19.

Eastern North Pacific Storm of May 14–15: Concurrent with the northwestern Pacific development described above, a slow-moving relatively compact storm system developed from a frontal wave of low pressure relatively far south in the eastern Pacific, west of California, as depicted in ***Figure 7***. The initial intensification was impressive, with the central pressure dropping 14 hPa to 1000 hPa in the six-hour period ending at 1200 UTC May 14. The second part of ***Figure 7*** shows the cyclone near maximum intensity. The **World Spirit**

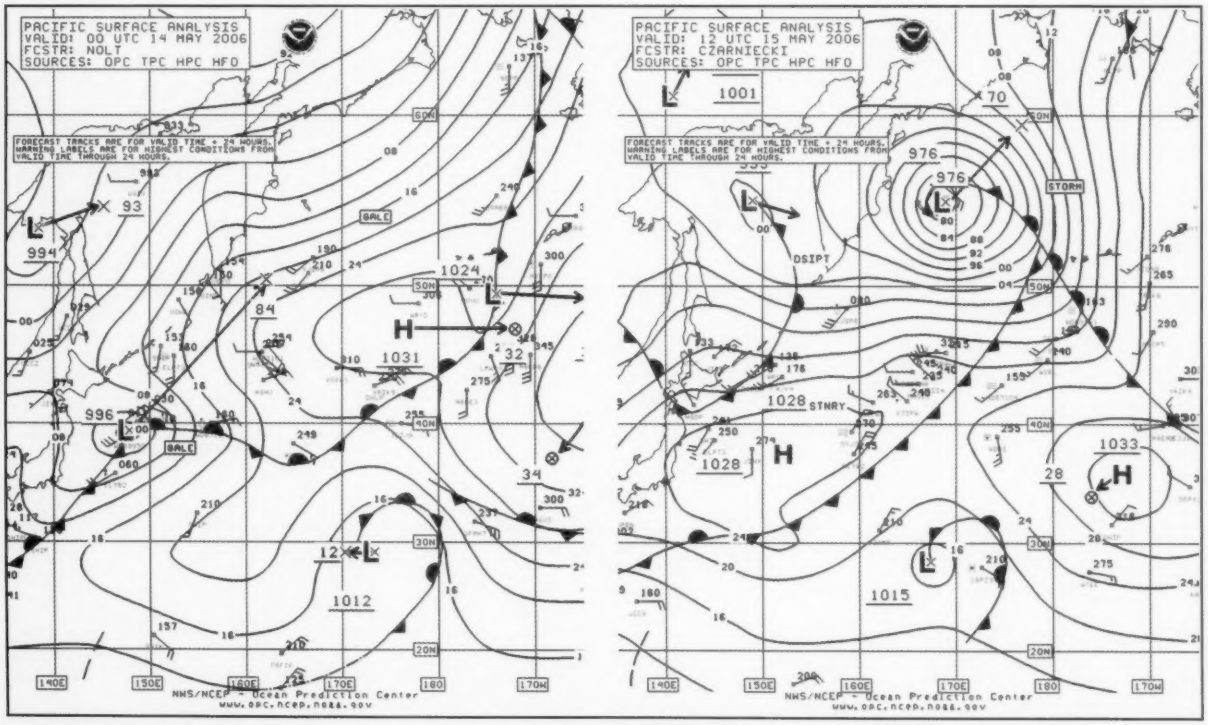


Figure 5. OPC North Pacific Surface Analysis charts (Part 2) valid 0000 UTC May 14 and 1200 UTC May 15, 2006.

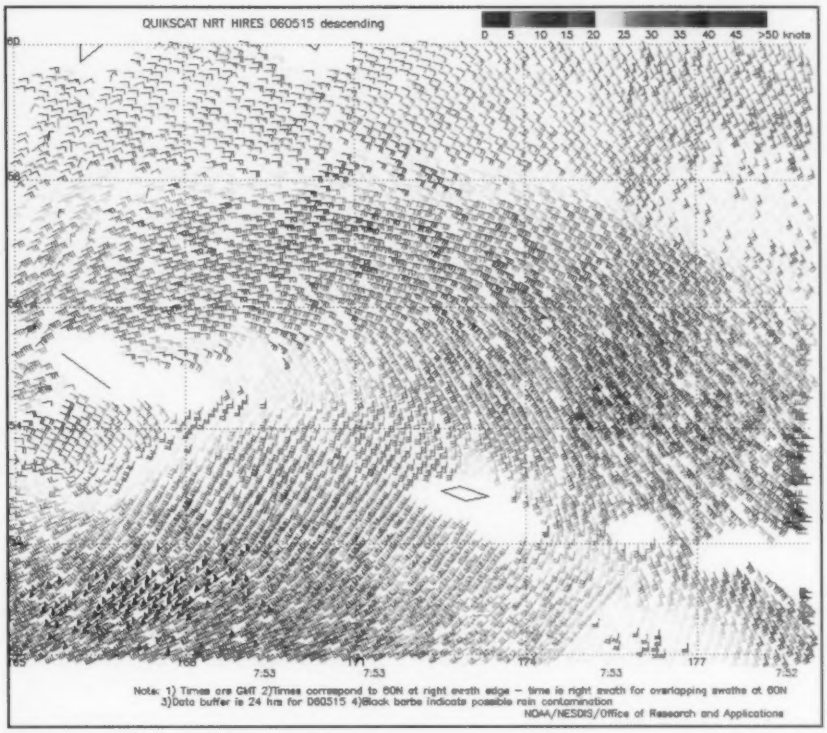

QUIKSCAT NRT HIRES 060515 descending
0 5 10 15 20 25 30 35 40 45 >50 knots
7:53
7:53
7:53
7:52
Note: 1) Times are GMT 2)Times correspond to 60N at right swath edge – time is right swath for overlapping swaths at 60N
3)Data buffer is 24 hrs for 060515 4)Black barbs indicate possible rain contamination
NOAA/NESDIS/Office of Research and Applications

Figure 6. High-resolution QuikScat scatterometer image of satellite-sensed winds around the eastern side of the storm shown in *Figure 5*. The valid time of the pass is 0753 UTC May 15, 2006, or about four hours prior to the valid time of the second part of *Figure 5*. The center of the storm is apparent near the left edge of the image, near 53N 165E.

Image is courtesy of NOAA/NESDIS/ Office of Research and Applications.

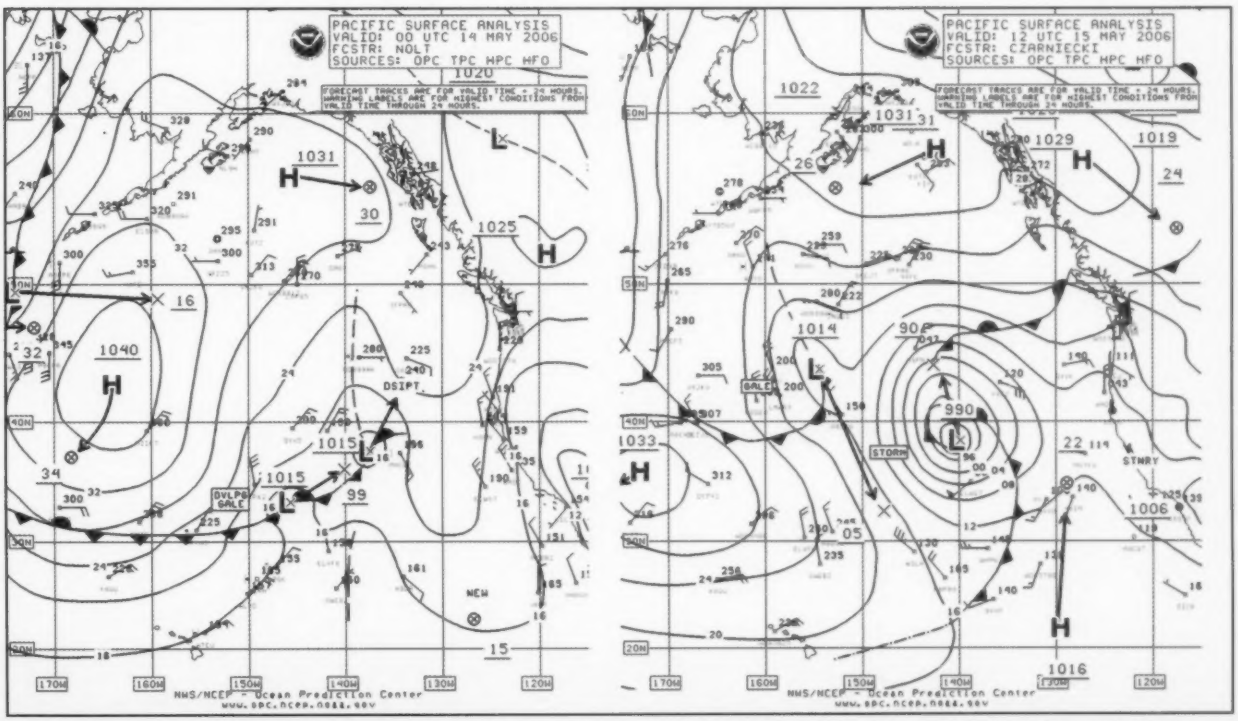

PACIFIC SURFACE ANALYSIS
VALID: 00 UTC 14 MAY 2006
FCSTR: NOLT
SOURCES: OPC TPC HPC HFO
PACIFIC SURFACE ANALYSIS
VALID: 12 UTC 15 MAY 2006
FCSTR: CZARNIECKI
SOURCES: OPC TPC HPC HFO
NWS/NCEP - Ocean Prediction Center
NWS/NCEP - Ocean Prediction Center

Figure 7. OPC North Pacific Surface Analysis charts (Part 1) valid 0000 UTC May 14 and 1200 UTC May 15, 2006.

(ELWG7) reported southwest winds of 50 kts south of the center at 1200 UTC on the 15th and is plotted in ***Figure 7***. The cyclone developed a lowest central pressure of 984 hPa near 42N 142W twelve hours later, but by then the circulation expanded and winds weakened to gale force. The system subsequently weakened slowly while drifting north through the 17th, before stalling off Southeast Alaska on May 18 and dissipating the next day.

Western North Pacific Storm, June 7–8: ***Figure 8*** shows the initial development of this unseasonably intense storm over a thirty-six hour period ending at 1200 UTC June 8, the time of the second part of ***Figure 8***. The central pressure fell 11 hPa in the twelve-hour period prior to reaching maximum intensity, 975 hPa. ***Figure 9*** is a high-resolution QuikScat pass showing winds to 70 kts on the south side of the storm center, over relatively warm water. The author cannot recall seeing hurricane-force winds in a non-tropical cyclone (without tropical origin) in the North Pacific in summer since OPC started using scatterometer winds in the late 1990s. Available conventional observations were sparse, with the **United Spirit** (ELYB2) reporting the strongest wind at 45 kts, from the northwest, near 40N 161E at 0000 UTC June 9. The same ship also reported seas of 11.0 m (36 ft). The cyclone subsequently weakened rapidly on June 8, and then more slowly afterwards, while moving east-northeast with winds lowering to gale force by early on the 9th. The cyclone then turned more north toward the eastern Aleutians on June 10 and dissipated over southwestern Alaska on the 12th.

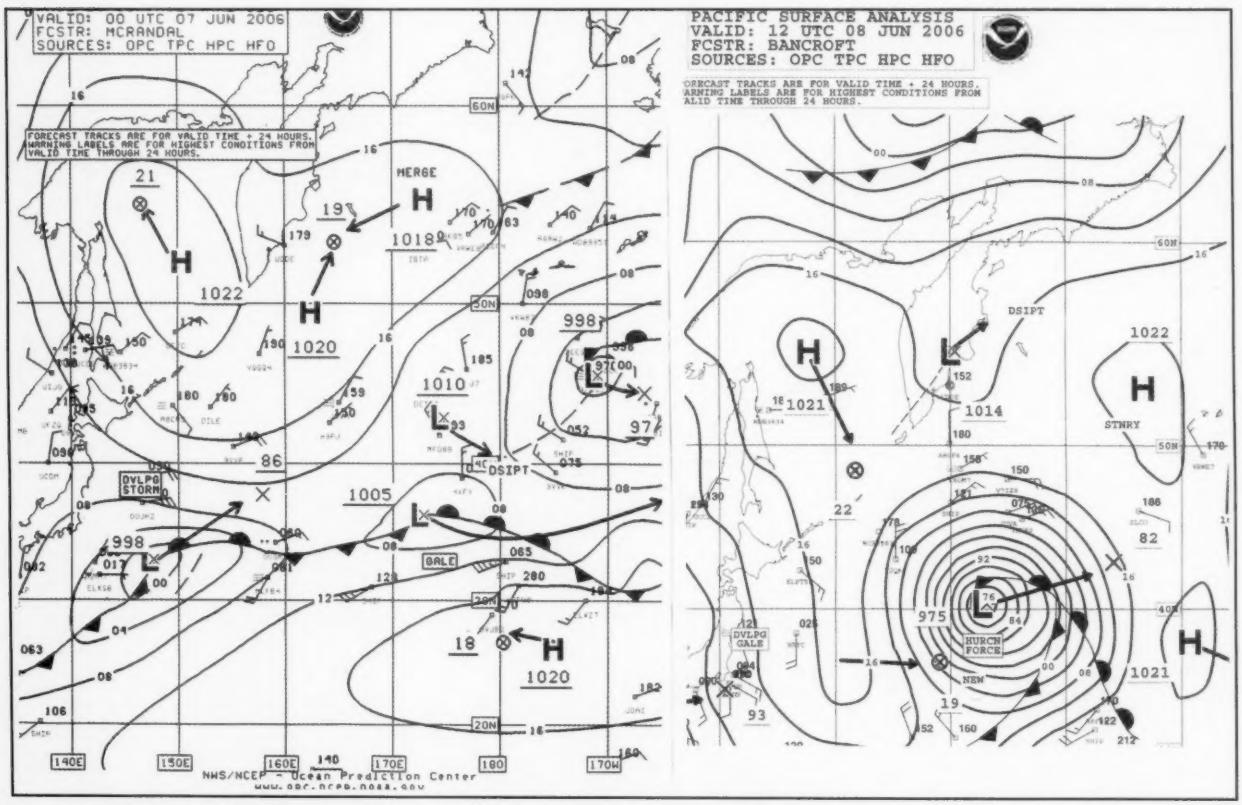

VALID: 00 UTC 07 JUN 2006
FCSTR: MCRANDAL
SOURCES: OPC TPC HPC HFO
FORECAST TRACKS ARE FOR VALID TIME + 24 HOURS.
WARNING LABELS ARE FOR HIGHEST CONDITIONS FROM VALID TIME THROUGH 24 HOURS.
MERGE
DVLPG STORM
DSIPT
GALE
NWS/NCEP - Ocean Prediction Center
PACIFIC SURFACE ANALYSIS
VALID: 12 UTC 08 JUN 2006
FCSTR: BANCROFT
SOURCES: OPC TPC HPC HFO
FORECAST TRACKS ARE FOR VALID TIME + 24 HOURS.
WARNING LABELS ARE FOR HIGHEST CONDITIONS FROM VALID TIME THROUGH 24 HOURS.
DSIPT
STNRY
DVLPG GALE
HURCN FORCE

Figure 8. OPC North Pacific Surface Analysis charts (Part 2) valid 0000 UTC June 7 and 1200 UTC June 8, 2006.

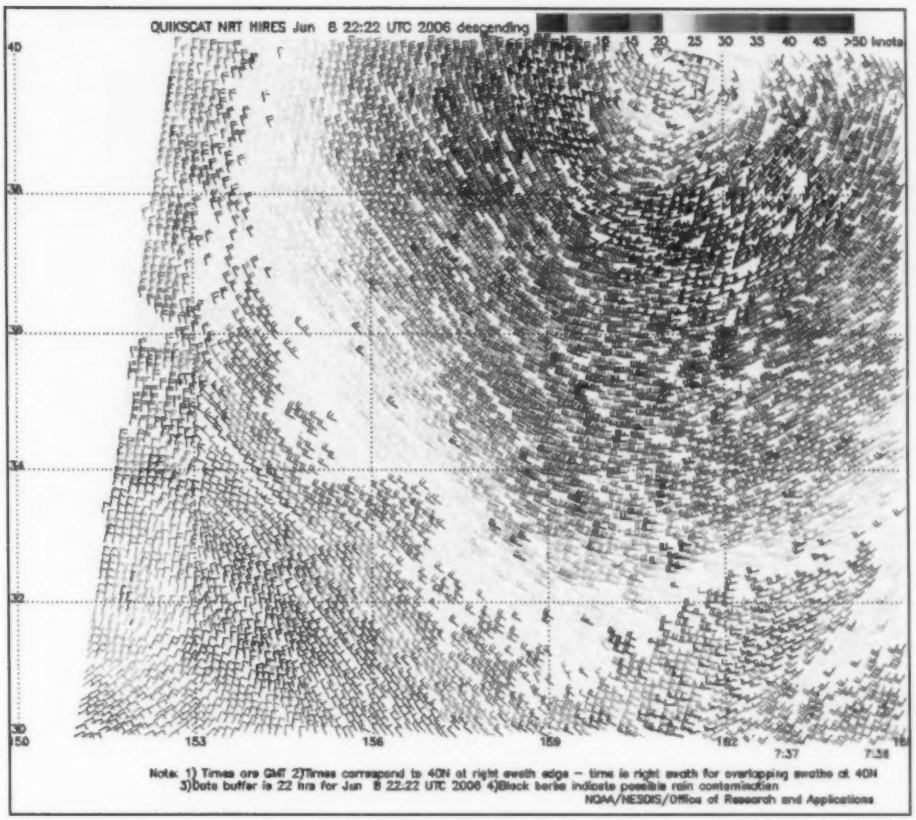


Figure 9. High-resolution QuikScat scatterometer image of satellite-sensed winds around the south and southwest sides of the storm shown in the second part of Figure 8. The valid time of the pass is 0737 UTC June 8, 2006, or about four and one-half hours prior to the valid time of the second part of Figure 8. The center of the storm is apparent in the upper right portion of the figure near 40N 161E.

Image is courtesy of NOAA/NESDIS/ Office of Research and Applications

References

1. From Tropical Prediction Center website, http://www.nhc.noaa.gov/aboutsshs.shtml.

2. Sienkiewicz, J. and Chesneau, L., Mariner's Guide to the 500-Mb Chart (Mariners Weather Log, Winter 1995).

Tropical Atlantic and Tropical East Pacific Areas May through August 2006

Robbie Berg and Mark Willis, Tropical Analysis and Forecast Branch, Tropical Prediction Center, Miami, Florida

Introduction

The May through August time period includes the beginning of the 2006 hurricane season. Thus, much of the significant weather during this period was due to tropical cyclones that developed in both the Atlantic and East Pacific Basins. In the Atlantic, five named storms developed during this time frame, including one hurricane (Ernesto). Gale warnings were issued in TPC's Tropical Analysis and Forecast Branch (TAFB) Atlantic high seas forecasts on two non-tropical events. The first event was associated with a late season cold front while the second was a long-lived event associated with strong Atlantic high pressure. Eleven named storms developed in the East Pacific including seven hurricanes, while only one non-tropical gale warning was issued for a late season Gulf of Tehuantepec event. The details of the 2006 hurricane season will be discussed in a future edition of the Mariner's Weather Log.

Atlantic

The first non-tropical gale warning during the period was issued at 0600 UTC on 17 May in association with the same late-season frontal system that initiated a gale warning in the Gulf of Tehuantepec (discussed in this article). The warning in the southwest North Atlantic was due to expected prefrontal 30 to 35 kts south to southwest winds. At 0600 UTC 17 May, the cold front extended northeast through the northwest Caribbean Sea and southeast Gulf of Mexico, through Florida, and into the southwest North Atlantic with a pair of 1006 hPa lows centered just north of the western tip of Cuba and over the Atlantic waters just east of the south central Florida coast (***Figure 1***). At 0600 UTC May 17, the frontal system was interacting with the southwest periphery of a 1023 hPa Bermuda-Azores high pressure area. The available surface, buoy, and ship observations were mostly 10 kts or more below gale force from 0600–1200 UTC May 17. However, between 1200 UTC May 17 and 0000 UTC May 18 the Bermuda-Azores strengthened to 1030 hPa while the low just east of the south central Florida coast also deepened slightly to 1005 hPa by 1800 UTC May 17. The associated increase in pressure gradient led to increased southwesterly winds, with U.S. Navy drifting buoy 41645 and the ship **British Merchant** (VQIB9) both reporting 30 kts just east of the deepening low at 1800 UTC. Also, a descending QuikSCAT pass at 2218 UTC 17 May (***Figure 2***) showed increased south to southwesterly winds in the warning area in comparison with the previous ascending pass over the area at 0958 UTC. Both of these QuikSCAT passes revealed a few rain-contaminated 35 kt vectors. However, the surrounding data were not rain-contaminated and were just below gale force, indicating that this was a marginal gale event. Unfortunately QuikSCAT coverage in

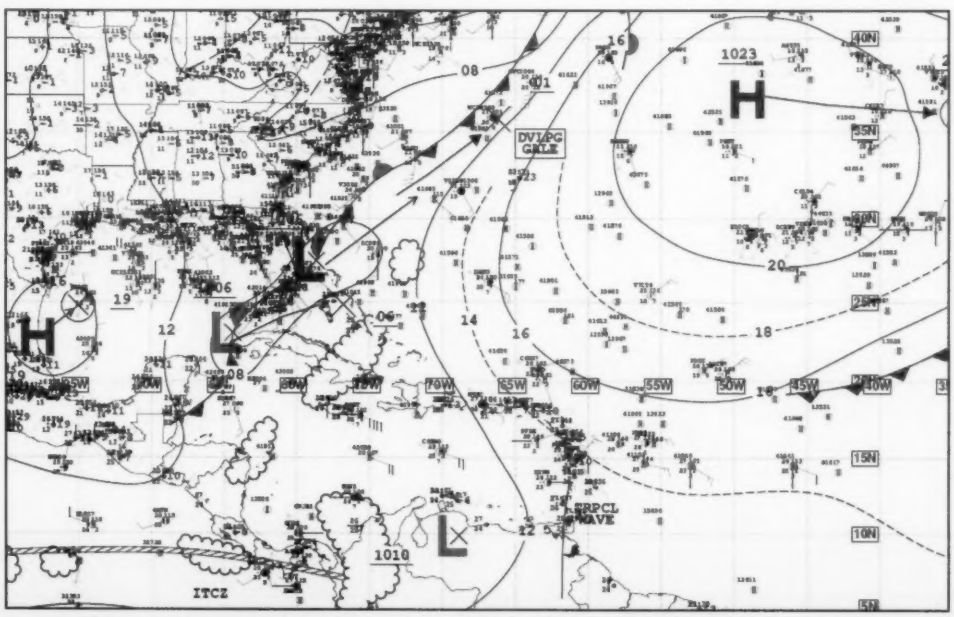


Figure 1. National Weather Service Unified Surface Map from 0600 UTC 17 May.

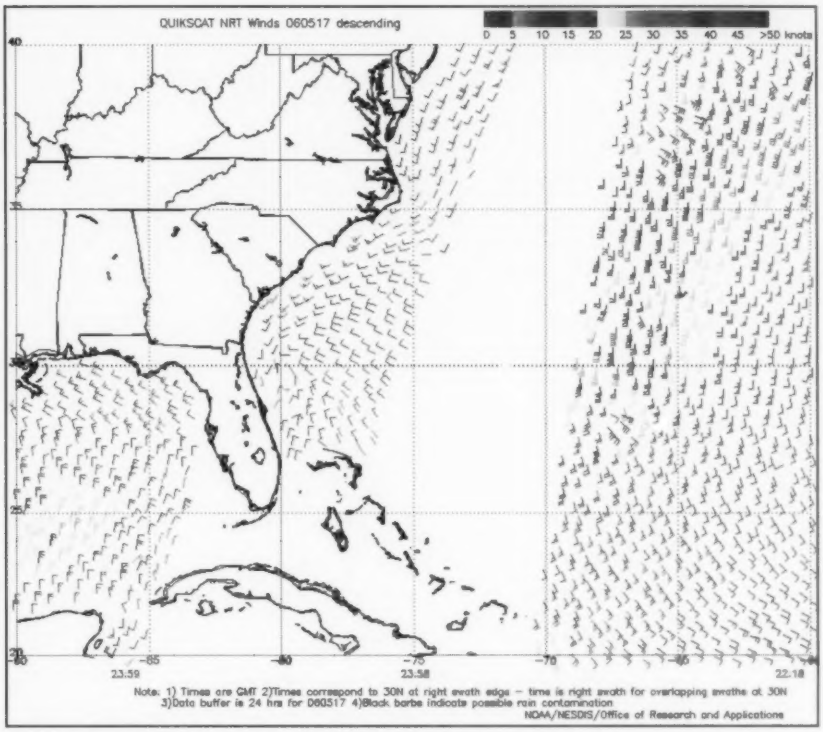

QUIKSCAT NRT Winds 060517 descending
0 5 10 15 20 25 30 35 40 45 >50 knots
40
35
30
25
20
-90 -85 -80 -75 -70 -65 -60
23:59 23:58 22:18
Note: 1) Times are GMT 2)Times correspond to 30N at right swath edge – time is right swath for overlapping swaths at 30N
3)Data buffer is 24 hrs for 060517 4)Black barbs indicate possible rain contamination
NOAA/NESDIS/Office of Research and Applications

Figure 2. QuikSCAT pass from 2218 UTC May 17, 2006 showing strong prefrontal S/SW winds off the East Coast.

the tropical North Atlantic on 17 May just northeast of the Bahamas was lacking due to gaps in the satellite's orbit.

There were numerous gale warnings posted and cancelled from 26 June through 11 July due to strong easterly trade winds in the southwest Caribbean Sea south of 15N between 70W and 80W. This is only described as one event due to the minor fluctuation of the trade winds during the period. The gale warnings were verified by several ship observations during the span of the event. The event was generated by a strong pressure gradient associated with the interaction of a subtropical high in the central Atlantic with lower pressure near Colombia, and occasionally enhanced by tropical waves propagating through the area. The strong subtropical high north of the area was generally analyzed between 1030 to 1040 hPa throughout the event (***Figure 3***).

Westward propagating swells associated with these types of events commonly produce dangerous surf conditions at exposed beaches along the Caribbean coast of Central America. Data from NOAA buoys 42057 and 42056 in the western Caribbean portray how the effects of this event spread well outside the strongest wind region. At 2100 UTC 06 July, buoy 42057 had a peak significant wave height of 2.8 m (9.3 ft) and a dominant period of 10 seconds. Even farther away, the Yucatan Basin buoy 42056 recorded 2 to 2.5 m (6 to 8 ft) seas with 8 to 10 second dominant periods from 0800 UTC 7 July through 1300 UTC 8 July. It is interesting to note that the directional wave sensor on this buoy showed the swell coming from the east-southeast during this time. This swell direction was likely due to the angular spreading of the ocean swells propagating outside of the gale warning area.

Eastern Pacific

On average, the latest date for the last Gulf of Tehuantepec gale for the win-

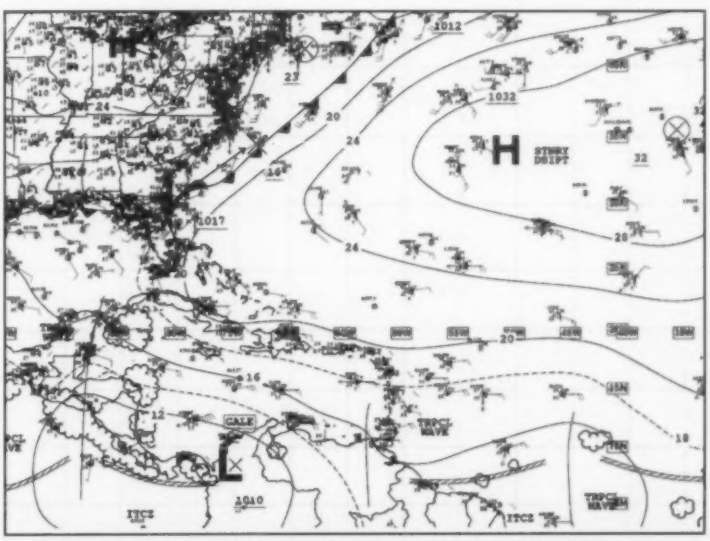


Figure 3. National Weather Service Unified Surface Map from 0600 UTC 7 July

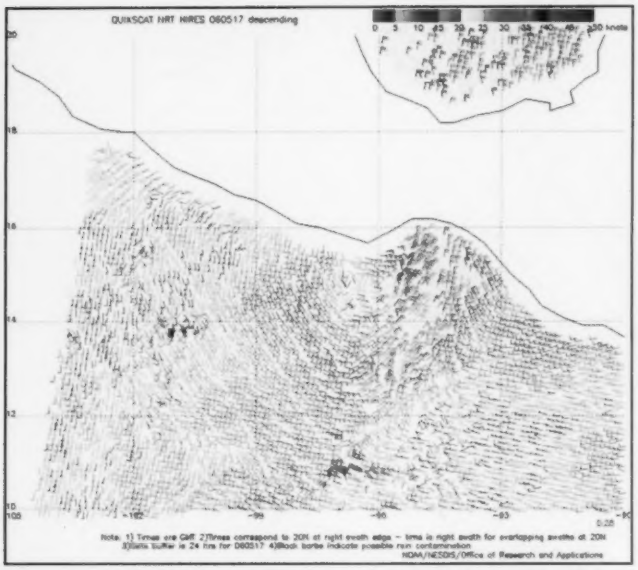


Figure 4. QuikSCAT pass from 0028 UTC May 17, 2006 showing gale force winds over the Gulf of Tehauntepec.

ter season is April 1. This year, one gale event was noted in the Gulf beginning around 0000 UTC May 17, about a month and a half later than normal and just after the beginning date of the East Pacific hurricane season. This event was spurred by a late-season cold front which moved into the Gulf of Mexico around 0000 UTC May 15 and moved southeast across the region, reaching the Isthmus of Tehuantepec nearly 24 hours later (discussed previously in the article). By 1200 UTC May 16, a QuikSCAT pass indicated that the wind surge had begun over the Gulf of Tehuantepec with wind speeds near 30 kts. The next QuikSCAT pass on the evening of May 16 showed that winds had increased to near 40 kts, prompting the issuance of a gale warning by TAFB (***Figure 4***). The warning was in effect for 18 hours and was verified by a QuikSCAT pass near 0000 UTC May 18 that showed winds just below gale force. The highest wind reported by a ship in the region was 30 kts by the **ZIM Israel** (9HBG8) at 1200 UTC May 17 near 13.5N 94.3W, or just east of the strongest belt of winds.

A second gale event was observed later in the month on May 22 over the northern Gulf of California, but the lack of observations and complex topography of this region caused this event to go unforecasted. The event began as two areas of low pressure approached the coast of southern California with a cold front trailing southward west of the Baja peninsula (***Figure 5***). Low-level southwesterly flow increased ahead of the front by 0000 UTC May 22, but model guidance only indicated maximum winds of 25 kts over the northern Gulf of California. In addition, the models indicated that these winds had peaked and would not strengthen any further during the next 12 to 18 hours. However, a QuikSCAT pass around 1200 UTC May 22 revealed that winds had indeed increased with gale conditions over the far northern part of the Gulf (***Figure 6***). TAFB did not issue a warning since these winds were expected to decrease below gale force within a few hours. A 999 hPa low was analyzed just south of Las Vegas, Nevada, near the time of the QuikSCAT pass, but model forecasts only had pressures as low as 1004 hPa at that time. This 5 hPa discrepancy likely led to the low wind forecast in the models (***Figure 7***). Additionally, it is unclear how the complex terrain of northwestern Mexico and the southwestern United States may have affected the models. Ship observations are rarely received from the Gulf of

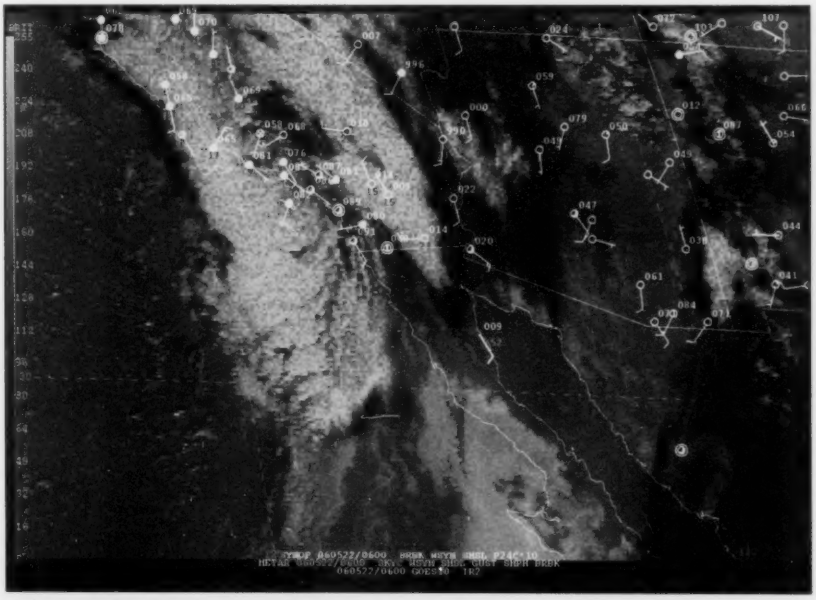


Figure 5. Satellite image and surface observations from 0600 UTC May 22, 2006 showing a cold front approaching the west coast of Baja California.

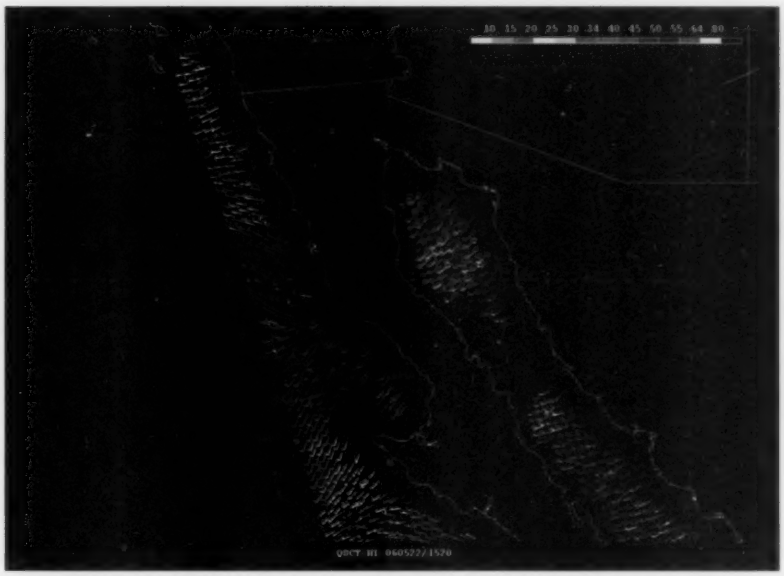


Figure 6. QuikSCAT pass from 1250 UTC May 22, 2006 showing winds stronger than 34 kts (gale force) over the extreme north part of the Gulf of California

California, but coastal observations provided by the Mexican Navy suggest that gale conditions did occur over the open waters. San Felipe (in the state of Baja California) and Puerto Peñasco (in the state of Sonora) both reported maximum winds of 29 kts and 28 kts, respectively, just below gale force over land. In addition, several stations across the deserts of California and Arizona reported strong, gusty winds, including Phoenix with 33 kts gusting to 36 kts and El Centro, CA, with 34 kts gusting to 41 kts. Based on these observations and QuikSCAT data, this gale event likely lasted for about 12 hours. Due to poor model performance and a sparse network of surface observations, our knowledge of this complex region must be increased in order to correctly predict the occurrence of these rare gale events. Additional ship observations from the Gulf of California would aid in the recognition of gale events and allow forecasters to become familiar with weather patterns in place when these events occur. This would go a long way in improving future forecasts of these rare gales.

Biography

Robbie Berg has worked as a forecaster in the Tropical Analysis and Forecast Branch of the Tropical Prediction Center/National Hurricane Center since June 2002. He received a B.S. degree in meteorology and a B.S. degree in marine science from North Carolina State University and is currently pursuing a M.S. degree in meteorology from the University of Miami.

Mark Willis has worked as a forecaster in the Tropical Analysis and Forecast Branch of the Tropical Prediction Center/National Hurricane Center since July 2006. His previous work experience includes the National Weather Service forecast office in Eureka, CA, and the private marine forecasting firm Surfline, Inc. He received a B.S. degree in meteorology from Florida State University and a M.S. degree in meteorology from the University of Hawaii at Manoa.

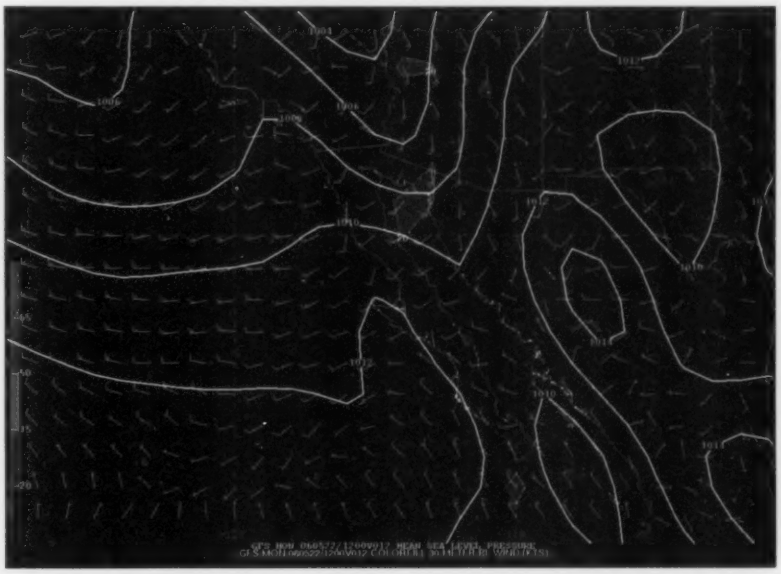


Figure 7. Sea level pressure and 30 m wind field from the Global Forecast System (FGFS) model valid at 1200 UTC May 22, 2006. The model predicted maximum winds near 25 kts whereas the QuikSCAT pass in *Figure 6* indicated maximum winds at least 35 kts.

Mean Circulation Highlights and Climate Anomalies May through August 2006

A. James Wagner, Senior Forecaster, Climate Operations Branch, Climate Prediction Center /NCEP/NWS/NOAA.

May–June 2006

The circulation pattern over the Northern Hemisphere during May and June was characterized by generally above normal middle tropospheric heights over the western U.S. and most of Canada, surrounding an amplified trough that extended from the Great Lakes southward along the East Coast. Above normal heights and a stronger than normal surface high pressure ridge were also observed over southwestern Europe and the western Mediterranean. Above normal 500 hPa heights and sea level pressure were found over the northwestern Pacific, including the Bering Sea and Aleutians, while a stronger than normal middle tropospheric low prevailed over much of the Arctic Ocean, with a trough extension southward to Iceland.

The pattern over North America was more blocked in May, with well above normal heights over northeastern Canada and a rather strong trough near the East Coast. During June, heights over high latitudes, including northeastern Canada, were below normal, while strong ridges developed over the Rockies and Great Plains of North America, as well as over the Canadian Maritimes. Temperatures rapidly rose to well above normal over the West and the Great Plains, with some near record values observed in areas where long-standing dyrness over parts of the Great Plains also augmented the heat. The eastern U.S. remained cool, and periods of unusually wet weather affected parts of New England and the Middle Atlantic States, producing severe flooding in some areas. The strengthening ridge over the West set the stage for a bad summer wildfire season, following a generally good winter and early spring rainy season that had eliminated much of the long-term drought that had plagued the area the past several years. In contrast, severe drought and numerous wildfires continued in the Southwest.

July–August 2006

During the high summer months of July and August, middle tropospheric heights and surface pressures were generally lower than normal over the Arctic Basin and a deeper than normal trough prevailed over Alaska most of the time, in sharp contrast to the patterns that had prevailed in those regions during the previous two summers. These high latitude circulation anomalies were particularly strong in August. The result was a relatively benign season for wildfires in Alaska in 2006 due to prevailing cool and wet conditions. Above normal middle tropospheric heights continued over the northwestern Pacific from the previous two months, and they were also above normal from Greenland across the north Atlantic to Scandinavia. Heights were below normal over central and southern Europe, especially during August. A third area of above normal 500 hPa heights extended from the Pacific Northwest coast eastward to the upper Mississippi Valley near the U.S.-Canadian border, while immediately downstream a slightly stronger than normal trough prevailed over the Canadian Maritimes.

Both July and August were predominantly warmer than normal months over the lower 48 States, with the most excessive heat being located in the Great Plains and Rockies in July and generally over the eastern half of the country during August. The heat was exacerbated by severe drought in much of the Great Plains, and temperatures in Wyoming and the Dakotas rose to levels not seen since the Dust Bowl in the 1930s. The ridge over the Rockies was particularly strong during July, but a weak trough developed near the West Coast during August leading to more seasonable temperatures. As is often the case when the western ridge is anomalously strong and centered north of its normal summer position, the Southwest Monsoon was unusually active and much of Arizona, New Mexico, and west Texas was much wetter than normal, and flooding occurred in some locations that had gone for several months from last fall through late spring with no significant precipitation.

The Tropics

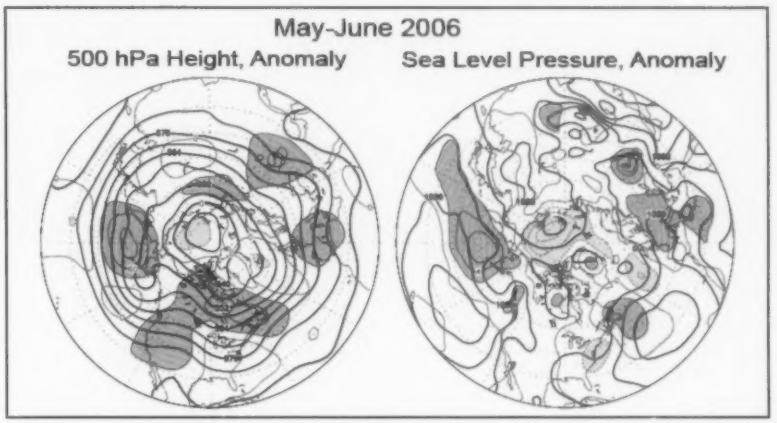
The status of the El Nino—Southern Oscillation (ENSO) phenomenon remained in neutral territory throughout the late spring and summer months, but it was undergoing a gradual transition from the weak La Nina that had prevailed during the previous winter and early spring to the onset of weak El Nino conditions in early September. Madden-Julian waves were generally weak throughout this

period. Throughout most of the summer, convective activity in the atmosphere was concentrated along the northern ITCZ near 10 N over the Pacific, as is typical for this time of year.

Although sea-surface temperatures were above normal over much of the entire tropical and subtropical Atlantic Basin, they were not as warm as last year in most places. This and other factors such as more vertical shear and possibly the trend towards El Nino conditions over the equatorial Pacific were probably the main factor contributing to a much less active tropical storm season in the area than the record active one in 2005. Through August, five named tropical storms developed, one each in June and July and three in August. None reached hurricane intensity until Ernesto, at the end of August.

There were a total of eleven named storms over the eastern Pacific through the end of August. After a somewhat slow start with one in May and none in June and the first third of July, six storms formed in July and four more in August. Three of the July storms and all four of the August developments reached hurricane intensity. SSTs were well above normal along the west coast of Mexico, which may have been a contributing factor to the rather active season. The trend towards El Nino conditions over the equatorial Pacific also probably contributed positively to the late summer increase in activity, as the ENSO cycle affects tropical activity in the Atlantic and eastern Pacific basins with opposite polarities.

Generally above normal SSTs over the western Pacific and deep easterlies strengthened by the above normal heights and SLP over the northwestern Pacific noted earlier contributed to an active typhoon season over the western Pacific, by providing more moisture and reducing vertical shear. The abnormally strong easterly components of the flow also steered several of the storms into mainland China, bringing much devastation.



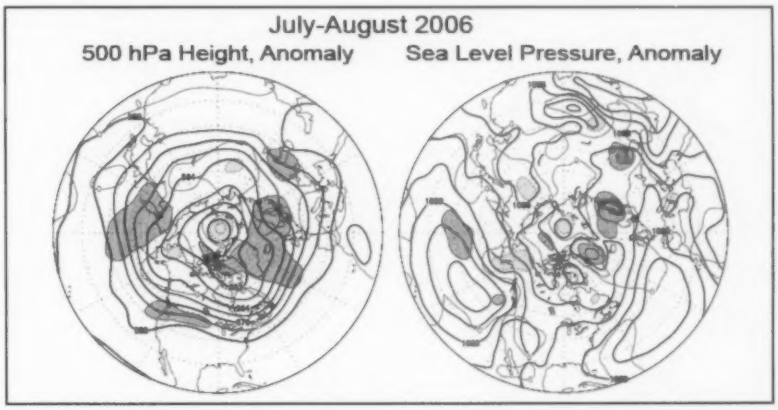


Figure legends and description of units:

The charts on the left shows the seasonal mean 500 hPa height contours at 60 m intervals in heavy solid lines, with alternate contours labeled in decameters (dm). Positive height anomalies are contoured in light solid lines at 30 m intervals, and light dashed lines show negative height anomalies. Areas of mean height anomalies more than 30 m above normal have heavy shading, and areas of mean height anomalies more than 30 m below normal have light shading.

The charts on the right show the seasonal mean sea level pressure (SLP) at 4 hPa intervals in heavy solid lines, labeled in hPa at selected intervals. Anomalies of SLP are contoured in light lines at 2 hPa intervals, with dark shading and solid lines in areas more than 2 hPa above normal, and light shading with dashed lines in areas greater than 2 mb below normal.

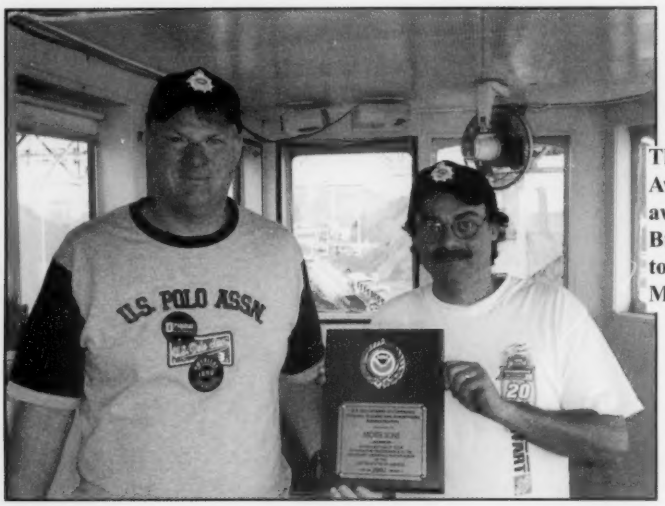
VOS Program Awards

Receiving their third VOS Award are the crew from the *Barrington Island*. From left to right are Second Officer Jakov Petrovik, Master Stefan Predota, and Chief Officer Savo Loncar.

The *Arctic Sun* received a VOS Award on August 3, 2006 at the Port of Nikiski, Alaska. From left to right are First Pumpman A. Agosta, Second Officer G. Faldetta, Second Officer L. Staino, Second Officer C. Felici, Marathon Port Engineer T. Debban, Captain M. Bianco, and First Officer G. Masiello. Not pictured, but contributing to the sucess of the *Arctic Sun* award are Second Mate Luigi Lucignano, Second Mate Franco Di Cristo, and Second Mate Luigi Galano. The *Arctic Sun* is one of the World's Leading Voluntary Observing Ship top performers for 2005 with a total of 3, 307 observations. This is a 65% increase over 2004. They are doing an outstanding job with observations again this year and are well on their way to breaking their highest total again. Due to their computer and communications configuration on the bridge, the *Arctic Sun* crew is required to hand code their marine observations. The *Arctic Sun* is a LNG tanker which makes 18 round trips per year between the ports of Mikiski, Alaska and Tokyo, Japan.

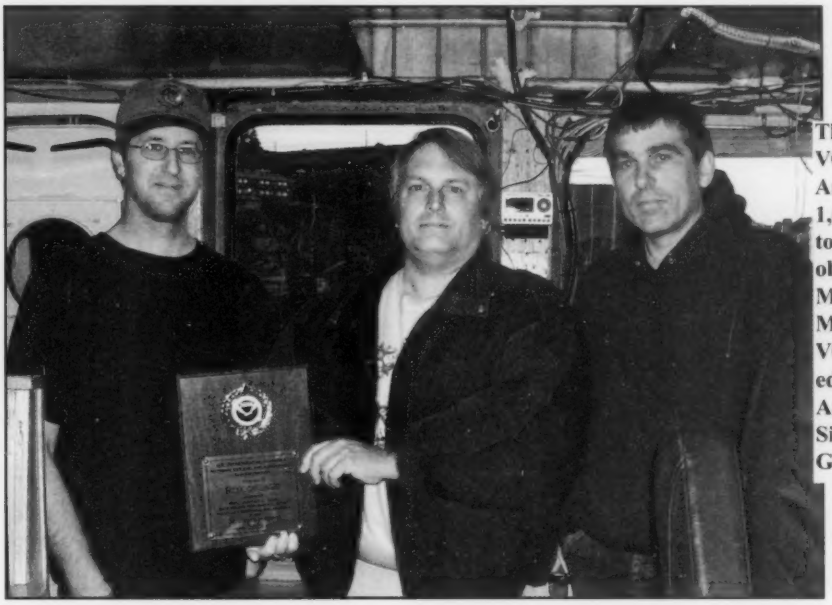
A VOS Award was presented to the *Discoverer Deep Seas* marine crew. From left to right receiving the award are Captain/Master Doug Banfield, Senior DPO/Third Mate Scott Beck, DPO/Third Mate Jamie Taylor, Senior DPO Greg Stanfield, and Offshore Installation Manager Clayton Ballard.

The *Liberty Star* is a 2005 VOS Award recipient. From left to right receiving the award are Chief Mate Clancy Faucheux, Cadet Matthew Hilton, Captain David Black, Second Mate Larry Wolff, Third Mate Paul Wagner, and Cadet Seth Ching.



The *McKee Sons* received a 2005 VOS Award. Pictured left to right receiving the award are Captain Patrick Hart and Mate Brian Harvey. Not pictured, but contributing to the award are Mate Tony Szymanski, Mate Bill Moslow, and Mate Lee Meeker.

The *Polar Eagle* received a 2005 VOS Award. From left to right receiving the award are Second Mate D. Scano, Captain G. D'Agostino, and Chief Officer L. Colelli. Like many VOS participants, bridge computer and communications configurations require the crew to code their marine observations by hand. In spite of this extra work, they were the second leading U.S. VOS ship for 2005 with 2,620 observations. This was a new ship's record and a 17% increase over their 2004 total. The *Polar Eagle* is a LNG tanker which makes 18 round trips per year between the ports of Nikiski, Alaska and Tokyo, Japan. This photo was taken on July 25, 2006, at the Port of Nikisiki, Alaska.



The *Pacific Challenger* received a 2005 VOS Award in Kodiak, Alaska on August 29, 2006. The crew submitted 1,690 observations in 2005, making it the top reporting tug in the U.S. volunteer observing fleet. Receiving the award are Master Pete Pawlicki (left) and Chief Mate Bob Salter (right). Jeff Jenner, VOS Project Manager (center), presented the award. Not pictured are Master Amos Crauthers, Chief Mate Jacek Sidorski, and Second Mates Shane Gorman and Dan Puterbaugh.

Sealand Florida Master Robert C. Sargeant was presented the 2005 VOS Award for outstanding service in providing over 897 quality and timely marine weather observations for the year, a number of which were extremely important during the busy hurricane season. Efforts of the entire *Sealand Florida* crew including Master Dennis Newbanks are applauded and appreciated.

A VOS Award for 2005 was presented to *United Spirit*. Pictured left to right receiving the award: Third Officer Joemer Pujida, Second Officer Iomedio Agapin, Jr., Captain Will Doruelo, and Chief Mate Renato Agbayani.

The crew members of the *Strong Patriot* received a VOS Award. Pictured left to right receiving the award: Chief Mate Danny Lopez, Captain Jerry Bowers (holding plaque) and, Third Mate Jim Cochran.

A 2005 VOS Award was proudly presented to the *Westwood Columbia* for peak performance. Pictured left to right receiving the award: Captain Rohit Puri (Superintendent), Chief Officer Samtosh Singli, Captain L.A. Chaudlry, Chief Engineer Anil Kumar, and Chief Officer Joseph Tharakan.

A VOS Award for 2005 was presented to *Westwood Ranier*. Pictured left to right receiving the award: Captain R. C. Dias, Second Officer Guna Ranjan, and Chief Officer K.J. Thambi.

The *UBC Saiki* received a 2005 VOS Award. Pictured left to right with the award are Junior Officer James Russell Zulla, Captain Hakon Isaksson, Chief Officer Robert De Jose, and Second Officer Larry Moquerio. Their trade the past two years has been in the US Gulf and Caribbean, including West Coast of Mexico and South America.

The *Kennicott* received a 2005 VOS Award. From left to right receiving the award: Captain Bill Hopkins, Chief Mate Matt Wilkens, Second Mate Mark Lundamo, Third Mate Derek Nystrom, and Third Mate Dennis Gum.

The *Montauk* received a 2005 VOS Award. From left to right are Captain Christian Von Rabenstein, Third Mate Pedro Dominguez, and Second Mate James Hoban.

The *Ron Brown* received a 2005 VOS Award. Pictured left to right on the top picture: CME Frank Dunlop, ENS James Brinkley, 1AE Robert Schwarz, 2AE Wayne Smith, CDR Birk, GVA Zielke, GVA Leo Wade, DU Reggie Williams, LT Elizabeth Jones, BGL David Owen, Captain Gary Petrae, PMO Paula Campbell, and LTJG Jackie Almeida.

The *Duncan Island* received a 2005 VOS Award. Pictured left to right receiving the award are Chief Officer Alfonso Armas, Captain Zdislaw Potocki, and Second Officer Michael Mancenido.

National Weather Service VOS Program New Recruits From July 1, 2006 through October 31, 2006

Name of Ship	Call	Agent Name	Recruiting PMO
ALEUTIAN	WSG6416	ALEUTIAN C/O SCHOONER SEAFOODS INC	VALDEZ, AK
ANDROMEDA VOYAGER	C6FZ6	ANDROMEDA VOYAGER C/O CHEVRON TRANSPORTATION CO.	ANCHORAGE, AK
APL JEDDAH	S6HU4	APL JEDDAH C/O NEPTUNE ORIENT LINES LTD	ANCHORAGE, AK
APL ZIRCON	S6EJ7	APL ZIRCON C/O NEPTUNE ORIENT LINES LTD	ANCHORAGE, AK
ARCTIC WOLF	WDC6481	ARCTIC WOLF C/O FAIRWEATHER MARINE LLC	ANCHORAGE, AK
CETUS LEADER	3EDF2	ZUIJIN SHIPHOLDING S.A.	NEW YORK CITY, NY
CROWN PRINCESS	ZCDM6	CROWN PRINCESS C/O PRINCESS CRUISES INC	ANCHORAGE, AK
CSCL VANCOUVER	VRBH2	RENAISSANCE SHIPPING AGENCY	NORFOLK, VA
DEEPWATER FRONTIER	HP9217	DEEPWATER FRONTIER TRANSOCEAN OFFSHORE DEEPWATER	ANCHORAGE, AK
DISCOVER 534	H3XQ	TRANSOCEAN INC.	HOUSTON, TX
DISCOVER SEVEN SEAS	3ELE	TRANSOCEAN INC	HOUSTON, TX
DYNAMIC ENERGY	C6FT3	DYNAMIC ENERGY C/O CHEVRON TRANSPORTATION CO.	ANCHORAGE, AK
ECEM KALKAVAN	V7JT6	TURKON AMERICA LINE	NORFOLK, VA
EVER DIAMOND	3FQS8	EVERGREEN AMERICA CORP	NEW YORK CITY, NY
EVER REWARD	3FYB3	EVERGREEN AMERICA CORP.	NEW YORK CITY, NY
FLYING-D	WYD9057	FLYING-D C/O NWS KODIAK	KODIAK, AK
GSF DEVELOPMENT DRILLER II	YJUL9	GLOBAL SANTAFE	HOUSTON, TX
GSF GRAND BANKS	YJUF7	GLOBAL SANTAFE	HOUSTON, TX
GULF RELIANCE	WDD2703	GULF RELIANCE C/O MARINE TRANSPORT CO.	KODIAK, AK
HASTU SMILE	MLTH5		SEATTLE, WA
HELENKA B	WAH5520	HELENKA B C/O WEL ASKA CORP.	ANCHORAGE, AK
HELSINKI EXPRESS	ZCDT8	NORTON LILLY	HOUSTON, TX
HYBUR TRADER	V2ZP5	TROPICAL SHIPPING	MIAMI, FL
INDOTRANS JAVA	VRZN7	NEW ORLEANS, LA	
KAINANI	WDC8819	KAINANI C/O FOSS MARITIME	KODIAK, AK
KODIAK KING	WCE8949	KODIAK KING C/O AMAK TOWING INC.	KODIAK, AK

Name of Ship	Call	Agent Name	Recruiting PMO
LIMARI	A8GT7	SOUTHERN SHIP MANAGEMENT	NEW YORK CITY, NY
MAERSK DAMPIER	A8EW2	HANSA SHIPPING	NEW YORK CITY, NY
MAERSK DJIBOUTI	A8JM8	NORTON LILY INTERNATIONAL, INC.	NORFOLK, VA
MAERSK NANHAI	C4AA2	KERR NORTON STRACHAN	NEW YORK CITY, NY
MAERSK NASSAU	V2OB5	KERR NORTON STRACHAN	NEW YORK CITY, NY
MARSEILLE STAR	9HCH7	ZIM	NEW YORK CITY, NY
MAUNALEI	KFMV	MATSON NAVIGATION CO. INC	BALTIMORE, MD
NOAA SHIP PISCES	WZZZ		NEW ORLEANS, LA
ORKUN KALKAVAN	V7JB8	TURKON AMERICA INC.	NORFOLK, VA
ORTO	3FFJ7		SEATTLE, WA
SAIPEM 7000	C6NO5	SAIPEM 7000 C/O EQUIPMENT RENTAL & SERVICES	ANCHORAGE, AK
SEASPAN QUEEN	CY7444	SEASPAN QUEEN C/O SEASPAN INTERNATIONAL	KODIAK, AK
ST LOUIS EXPRESS	WDD3825	NORTON LILLY	HOUSTON, TX
STAR ISFJORD	LAOX6		NEW ORLEANS, LA
TRITON	WDC9955	TRITON C/O DAHL TUG AND BARGE	KODIAK, AK
TROPIC ATLANTIC	V2OW4	TROPICAL SHIPPING	MIAMI, FL
TROPIC CANADA	V2OW1	TROPICAL SHIPPING	MIAMI, FL
TROPIC NIGHT	J8NX	TROPICAL SHIPPING	MIAMI, FL
TROPIC PALM	J8PB	TROPICAL SHIPPING	MIAMI, FL
TROPIC SUN	J8AZ2	TROPICAL SHIPPNG	MIAMI, FL
VEGA VOYAGER	C6FV3	VEGA VOYAGER C/O CHEVRON TRANSPORTATION CO.	ANCHORAGE, AK
WESTERN PATRIOT	HP7161	WESTERN PATRIOT C/O	NWS ANCHORAGE, AK
ZIM XIAMEN	MLCA2	ZIM AMERICA	NEW YORK CITY, NY

48 More Recruits
Welcome Aboard & Thanks! — Luke

VOS Cooperative Ship Report: January through October 2006

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ADAM E. CORNELIUS	WCY9870	Chicago	0	0	0	15	0	0	0	0	0	1	0	0	16
ADVANTAGE	WPPO	Norfolk	0	8	46	25	12	14	67	57	61	29	0	0	319
ADVENTURER	WBN3015	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
AIALIK BAY	KF004	Anchorage	0	0	0	0	1	0	0	0	0	0	0	0	1
AKN CHALLENGER	9V5652	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
ALASKA MARINER	WSM5364	Kodiak	0	0	14	0	0	0	0	0	0	1	0	0	15
ALASKAN EXPLORER	WDB9918	Valdez	11	1	18	13	63	80	57	58	76	58	0	0	435
ALASKAN FRONTIER	WDB7815	Valdez	0	0	0	13	43	75	79	1	16	14	0	0	241
ALASKAN LEADER	WDB7918	Kodiak	23	28	1	0	0	10	59	26	8	4	0	0	159
ALASKAN LEGEND	WDD2074	Valdez	0	0	0	0	0	0	0	0	20	10	0	0	30
ALASKAN NAVIGATOR	WDC6644	Valdez	10	25	33	25	10	41	13	57	31	31	0	0	276
ALBATROSS IV	WMVF	Norfolk	3	124	132	95	113	105	108	175	134	117	0	0	1106
ALBEMARLE ISLAND	C6LU3	Miami	51	44	20	37	25	16	34	17	21	33	0	0	298
ALERT	WCZ7335	Valdez	19	21	8	15	27	14	14	24	21	9	0	0	172
ALEUTIAN	WSG6416	Valdez	0	0	0	0	0	0	0	3	6	0	0	0	9
ALKIN KALKAVAN	V7GY3	Norfolk	20	29	32	17	16	0	0	0	0	0	0	0	114
ALLIANCE NEW YORK	KDUE	Jacksonville	0	0	0	0	0	0	0	0	32	14	0	0	46
ALPENA	WAV4647	Chicago	0	0	18	27	27	20	38	21	13	16	0	0	180
ALTAIR VOYAGER	C6OK	Baltimore	39	38	18	35	13	37	84	60	34	61	0	0	419
AMERICAN FORTITUDE	WDD2880	Chicago	0	0	0	0	1	0	0	0	0	0	0	0	1
AMERICAN INTEGRITY	WDD2875	Chicago	24	0	4	27	7	10	23	17	11	2	0	0	125
AMERICAN MARINER	WQZ7791	Chicago	0	0	0	0	0	0	0	0	0	67	0	0	67
AMERICAN REPUBLIC	WYR5386	Chicago	0	0	0	0	3	4	1	1	0	0	0	0	9
AMERICAN SPIRIT	WCX2417	Chicago	0	0	0	0	0	0	0	12	5	29	0	0	46
AMERICAN VALOR	WDD2878	Chicago	0	0	0	0	0	0	0	22	7	10	0	0	39
AMSTERDAM	PBAD	Anchorage	47	87	148	318	165	0	0	10	18	58	0	0	851
ANDROMEDA VOYAGER	C6FZ6	Anchorage	0	0	0	0	0	0	0	36	56	12	0	0	104
ANTARES VOYAGER	C6PZ3	Oakland	69	67	15	27	59	38	22	35	35	8	0	0	375
APL ALEXANDRITE	9VBA	Oakland	67	8	30	26	15	11	9	8	52	27	0	0	253
APL AMAZONITE	9VBX	Long Beach	59	41	56	47	47	55	74	20	20	23	0	0	442
APL CANADA	A8CG6	Oakland	62	45	34	38	63	37	65	61	66	58	0	0	529
APL CHINA	WDB3161	Long Beach	36	40	61	61	53	26	45	52	30	35	0	0	439
APL DALIAN	S6HU6	Norfolk	0	37	37	13	6	3	0	0	5	0	0	0	101
APL JADE	9VVD	New York City	2	0	38	35	40	47	43	57	17	24	0	0	303
APL JAPAN	S6TS	Seattle	82	45	45	55	49	38	40	23	28	13	0	0	418
APL JEDDAH	S6HU4	Anchorage	0	0	0	0	0	0	0	0	0	3	0	0	3
APL KENNEDY	9VAY4	Seattle	55	50	51	19	57	22	52	26	28	46	0	0	406
APL KOREA	WCX8883	Long Beach	46	18	28	30	51	50	8	12	29	64	0	0	336
APL NEW YORK	A8GS3	New York City	15	38	37	44	37	32	27	20	11	0	0	0	261
APL PERU	V2OE2	New York City	41	35	43	52	13	13	33	29	29	29	0	0	317
APL PHILIPPINES	WCX8884	Long Beach	0	0	23	34	35	39	52	25	38	32	0	0	278
APL SINGAPORE	WCX8812	Long Beach	39	50	62	34	49	61	70	56	23	54	0	0	498
APL SWEDEN	9VYY5	Seattle	7	63	37	47	55	62	68	75	57	67	0	0	538
APL THAILAND	WCX8882	Long Beach	37	26	22	44	40	27	30	38	33	19	0	0	316
APL TURQUOISE	9VVY	New York City	28	32	19	25	20	7	20	9	10	44	0	0	214
APL VIRGINIA	A8HA3	New York City	0	0	0	0	0	33	33	11	13	0	0	0	90
APL ZIRCON	S6EJ7	Anchorage	0	0	0	0	0	0	0	0	0	50	0	0	50

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AQUARIUS VOYAGER	C6UC3	Jacksonville	0	0	33	28	40	36	31	46	50	39	0	0	303
ARCTIC BEAR	WBP3396	Kodiak	0	0	0	0	0	0	22	69	92	108	0	0	291
ARCTIC OCEAN	C6T2062	New York City	0	35	39	33	37	18	19	41	18	21	0	0	261
ARCTIC SUN	ELQB8	Anchorage	508	366	261	289	372	411	435	430	311	277	0	0	3660
ARCTIC WOLF	WDC6481	Anchorage	0	0	0	0	0	0	0	0	3	0	0	0	3
ARGONAUT	KFDV	New York City	0	0	0	0	0	13	11	10	6	18	0	0	58
ARIZONA VOYAGER	KGBE	Miami	0	0	20	58	35	11	1	2	0	0	0	0	127
ARTHUR M. ANDERSON	WE4805	Chicago	40	0	5	32	34	26	25	3	60	100	0	0	325
ASPHALT COMMANDER	WFJN	New Orleans	23	9	7	0	17	45	67	18	50	146	0	0	382
ATLANTIC CARTIER	SCKB	Norfolk	39	25	45	41	28	34	44	46	33	25	0	0	360
ATLANTIC FOREST	WDB2122	New Orleans	0	0	0	0	0	0	0	0	0	46	0	0	46
ATLANTIC OCEAN	C6T2064	New York City	32	42	31	35	19	29	42	27	30	51	0	0	338
ATLANTIS	KAQP	Kodiak	1	0	0	0	0	0	2	1	0	0	0	0	4
ATTENTIVE	WCZ7337	Valdez	22	9	11	33	13	11	29	28	10	21	0	0	187
AVIK	WDB7888	Kodiak	0	0	0	0	18	10	3	5	1	31	0	0	68
AWARE	WCZ7336	Valdez	13	26	17	8	16	25	18	6	17	23	0	0	169
BARBARA ANDRIE	WTC9407	Chicago	3	0	0	0	2	0	1	0	0	0	0	0	6
BARBARA MCALLISTER	WCY7761	Kodiak	0	0	6	0	3	1	5	2	0	0	0	0	17
BARRINGTON ISLAND	C6QK	Miami	79	64	90	68	90	93	80	75	33	73	0	0	745
BARROW RESEARCH	KCB53	Anchorage	0	0	0	24	26	25	31	28	24	28	0	0	186
BENGAL SEA	ELPL3	New York City	54	0	28	75	0	8	0	0	0	0	0	0	165
BERING LEADER	WDC7227	Kodiak	13	37	29	0	0	0	0	0	0	0	0	0	79
BERING SEA	C6YY	Miami	0	0	40	61	41	47	34	0	0	1	0	0	224
BERNARDO QUINTANA A	C6KJ5	New Orleans	65	49	70	62	68	53	51	63	53	68	0	0	602
BESIRE KALKAVAN	V7GY4	Norfolk	1	2	44	38	25	24	0	0	0	0	0	0	134
BOW HUNTER	9VMU9	New York City	0	0	9	21	0	0	1	0	0	0	0	0	31
BRUCE	WWU8	Anchorage	8	3	7	3	12	4	13	14	11	1	0	0	76
BUCCANEER	WYW5588	Valdez	7	1	0	16	1	1	8	3	11	7	0	0	55
BUFFALO	WXS6134	Chicago	0	0	0	4	26	2	14	21	6	0	0	0	73
BULWARK	WBN4113	Valdez	0	2	24	38	1	15	3	25	38	11	0	0	157
BURNS HARBOR	WDC6027	Chicago	0	0	0	11	0	0	0	0	7	7	0	0	25
CAJUN EXPRESS	ELXL3	Houston	52	2	5	0	0	0	0	0	0	0	0	0	59
CAMAI	KF003	Kodiak	0	3	24	28	20	59	9	8	12	3	0	0	166
CANBERRA EXPRESS	VSUA7	Anchorage	22	17	20	1	1	0	0	55	13	13	0	0	142
CANMAR PROMISE	A8IP9	Anchorage	0	0	0	0	0	0	20	12	0	3	0	0	35
CAPE CHARLES	3EFX5	New York City	0	0	0	0	0	0	0	0	0	49	0	0	49
CARNIVAL CONQUEST	3FPQ9	New Orleans	27	186	99	43	36	16	37	24	16	6	0	0	490
CARNIVAL DESTINY	C6FN4	Miami	8	25	9	8	1	1	0	15	7	10	0	0	84
CARNIVAL FANTASY	H3GS	Jacksonville	0	52	45	44	12	27	24	9	4	7	0	0	224
CARNIVAL GLORY	3FPS9	Jacksonville	0	5	3	1	2	3	0	22	8	16	0	0	60
CARNIVAL HOLIDAY	C6FM6	New Orleans	0	0	1	11	17	22	16	10	10	18	0	0	105
CARNIVAL LEGEND	H3VT	Miami	16	7	0	6	5	46	36	29	21	16	0	0	182
CARNIVAL LIBERTY	HPYE	Miami	0	10	13	15	7	0	0	0	0	0	0	0	45
CARNIVAL MIRACLE	H3VS	Miami	10	2	0	6	5	3	0	12	4	15	0	0	57
CARNIVAL PRIDE	H3VU	Miami	1	0	0	7	3	1	1	0	12	49	0	0	74
CARNIVAL SENSATION	C6FM8	New Orleans	0	0	0	0	0	0	5	18	9	13	0	0	45
CARNIVAL SPIRIT	3FPR9	Anchorage	1	0	0	0	0	2	14	1	10	19	0	0	47
CARNIVAL TRIUMPH	C6FN5	Miami	39	41	16	8	12	24	12	10	35	38	0	0	235
CARNIVAL VALOR	H3VR	Miami	29	22	5	3	0	2	2	2	23	13	0	0	101
CARNIVAL VICTORY	3FFL8	Miami	31	27	37	28	42	37	28	14	15	11	0	0	270
CAROLINE MAERSK	OZWA2	Seattle	0	0	0	61	0	0	0	0	0	0	0	0	61
CARSTEN MAERSK	OZYB2	Seattle	18	0	0	0	0	0	0	0	0	18	0	0	36

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CASON J. CALLAWAY	WE4879	Chicago	0	0	9	36	97	112	132	77	113	70	0	0	646
CELEBRATION	H3GQ	Jacksonville	0	0	9	10	18	2	0	5	16	14	0	0	74
CELTIC SEA	C6RT	Miami	24	20	24	29	49	9	37	28	23	0	0	0	243
CENTURY	C6FU5	Miami	3	0	0	0	0	0	0	0	0	0	0	0	3
CERAM SEA	9VHB9	New Orleans	18	9	21	0	0	2	3	0	0	0	0	0	53
CHARLES ISLAND	C6JT	Miami	33	30	29	34	42	28	31	12	16	23	0	0	278
CHARLES M. BEEGHLEY	WL3108	Chicago	4	0	0	14	14	7	0	10	19	3	0	0	71
CHARLESTON	WBVY	Houston	0	0	0	0	0	0	0	27	30	35	0	0	92
CHARLOTTE MAERSK	OWLD2	Seattle	20	25	0	0	18	20	0	0	8	16	0	0	107
CHEMICAL EXPLORER	KRGC	Houston	6	28	0	4	23	60	54	22	26	0	0	0	223
CHEMICAL PIONEER	KAFO	Houston	0	1	0	2	16	0	0	8	39	18	0	0	84
CHEMICAL TRADER	KRGJ	Houston	17	12	2	0	16	14	19	8	0	31	0	0	119
CHEROKEE BRIDGE	V7FW7	New York City	18	56	50	62	54	51	40	26	22	9	0	0	388
CHESAPEAKE BAY	WMLH	Norfolk	26	31	40	42	45	30	47	23	20	35	0	0	339
CHESAPEAKE BAY BRIDGE	V7FW8	New York City	20	37	30	41	18	48	20	46	26	0	0	0	286
CHINOOK	WCY2791	Kodiak	0	0	0	0	4	0	0	0	0	0	0	0	4
CLEVELAND	KGXA	Houston	86	33	41	15	25	2	42	29	37	46	0	0	356
CLIFFORD MAERSK	OYRO2	Seattle	52	0	45	19	0	0	0	0	0	0	0	0	116
COASTAL NAVIGATOR	WCY9686	Seattle	0	0	0	0	1	0	0	0	0	0	0	0	1
COASTAL NOMAD	WSK2703	Kodiak	0	0	0	0	0	1	0	0	0	0	0	0	1
COASTAL NOMAD	WTP2735	Kodiak	0	0	0	0	0	0	1	0	0	0	0	0	1
COASTAL PILOT	WBP7281	Kodiak	0	0	0	0	2	0	0	0	0	0	0	0	2
COASTAL PROGRESS	WTE8342	Kodiak	0	0	0	0	0	0	1	0	0	0	0	0	1
COASTAL RELIANCE	WADZ	Kodiak	58	57	64	47	53	5	55	12	52	0	0	0	403
COASTAL TRADER	WSL8560	Kodiak	0	0	3	0	1	0	0	0	0	0	0	0	4
COLD BAY RESEARCH	KCI95	Anchorage	6	0	7	1	1	0	0	0	0	0	0	0	15
COLLIER BROTHERS	WUU7551	Valdez	4	0	0	0	1	0	0	0	0	0	0	0	5
COLORADO VOYAGER	KLHZ	Oakland	0	0	0	0	1	0	44	44	27	1	0	0	117
COLUMBINE MAERSK	OUHC2	Seattle	0	11	46	0	14	0	0	0	0	0	0	0	71
CONDOR	PJWQ	New York City	12	22	7	0	0	0	0	0	0	0	0	0	41
COPENHAGEN EXPRESS	ZCDP2	Charleston	16	47	22	32	24	15	8	0	0	0	0	0	164
CORAL SEA	C6YW	Miami	10	32	23	9	1	0	0	0	0	0	0	0	75
CORBIN FOSS	WDB5265	Kodiak	0	0	12	67	21	50	72	80	30	77	0	0	409
CORDELIA	A8GQ8	Miami	0	0	0	0	0	27	17	10	4	4	0	0	62
CORNELIA MAERSK	OWWS2	Seattle	46	3	4	46	0	26	9	0	0	0	0	0	134
CORWITH CRAMER	WTF3319	Kodiak	0	40	23	14	0	0	5	0	0	35	0	0	117
COSTA MAGICA	IBQQ	Miami	0	0	0	0	38	0	0	0	0	0	0	0	38
COURAGE	WDC6907	Baltimore	26	14	22	25	26	7	15	46	20	0	0	0	201
COURTNEY L	ZCAQ8	Baltimore	55	49	39	55	20	22	24	2	20	27	0	0	313
CP ACHIEVER	ZCDJ2	New Orleans	0	0	0	0	0	0	5	69	39	1	0	0	114
CP DISCOVERER	WGXO	Houston	112	38	62	66	57	61	61	64	66	109	0	0	696
CP EVERGLADES	ZIYE7	Houston	1	11	6	10	14	8	11	17	19	34	0	0	131
CP LIBERATOR	WGXN	Houston	133	121	93	106	169	96	80	83	91	118	0	0	1090
CP NAVIGATOR	WGMJ	Houston	100	204	157	159	125	177	323	221	135	84	0	0	1685
CROSS POINT	WDA3423	Kodiak	0	0	0	16	11	6	2	3	0	10	0	0	48
CROWN PRINCESS	ZCDM6	Anchorage	0	0	0	0	0	0	0	0	64	47	0	0	111
CSCL MELBOURNE	VRBI8	Norfolk	0	0	0	0	4	0	2	2	0	0	0	0	8
CSCL NEW YORK	VRBH7	Norfolk	45	0	29	0	40	9	16	7	10	24	0	0	180
CSCL VANCOUVER	VRBH2	Norfolk	0	0	0	0	0	0	12	15	0	0	0	0	27
CSCL XIAMEN	A8CL6	Norfolk	0	0	0	0	0	0	70	63	41	63	0	0	237
CSL CABO	D5XH	Seattle	22	35	3	3	0	0	2	20	16	17	0	0	118
DAIO ANDES	3FDN9	Anchorage	1	49	49	67	58	89	2	8	107	73	0	0	503

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
DAISHIN MARU	3FPS6	Seattle	0	0	5	0	0	0	0	0	0	0	0	0	5
DAVID FOSS	WYQ8110	Kodiak	0	0	3	8	19	23	18	35	0	0	0	0	106
DAVID STARR JORDAN	WTDK	Long Beach	1	120	4	81	60	71	60	106	90	75	0	0	668
DEEPWATER FRONTIER	HP9217	Anchorage	0	0	0	0	0	0	4	0	0	0	0	0	4
DEEPWATER HORIZON	V7HC9	Houston	85	139	97	133	108	82	96	64	105	335	0	0	1244
DEEPWATER MILLENNIUM	V7HD2	Houston	112	80	86	60	80	78	82	128	203	171	0	0	1080
DELAWARE II	KNBD	New York City	56	41	56	65	3	46	29	68	31	42	0	0	437
DELAWARE TRADER	WDB3258	Houston	59	41	30	37	30	66	63	66	0	14	0	0	406
DIANE H.	WUR7250	Kodiak	0	0	0	0	0	31	44	9	33	27	0	0	144
DIRCH MAERSK	OXQP2	Long Beach	7	31	52	36	25	16	30	26	19	29	0	0	271
DIRECT TUI	ELVZ5	Norfolk	671	518	27	5	0	0	0	0	0	0	0	0	1221
DISCOVERER DEEP SEAS	V7HC6	New Orleans	33	25	34	35	30	23	24	42	76	68	0	0	390
DISCOVERER ENTERPRISE	V7HD3	New Orleans	6	2	43	22	55	62	47	55	45	21	0	0	358
DISCOVERER SPIRIT	V7HC8	Houston	0	0	0	0	112	98	93	46	45	33	0	0	427
DISNEY MAGIC	C6PT7	Jacksonville	0	1	2	2	8	0	10	1	0	0	0	0	24
DREW FOSS	WYL5718	Kodiak	9	9	13	21	0	16	13	9	33	0	0	0	123
DUBAI EXPRESS	VRBN8	Norfolk	0	0	24	13	37	15	13	3	0	0	0	0	105
DUNCAN ISLAND	C6JS	Miami	19	7	29	45	38	45	46	44	14	20	0	0	307
DYNAMIC VISION	C6FQ6	Houston	0	0	0	32	0	12	69	31	14	7	0	0	165
EARL W. OGLEBAY	WDD3522	Chicago	0	0	0	0	0	1	2	0	0	3	0	0	6
ECEM KALKAVAN	V7JT6	Norfolk	0	0	0	0	0	0	0	0	2	27	0	0	29
ECSTASY	H3GR	Miami	0	0	0	5	12	12	5	12	10	9	0	0	65
EDGAR B. SPEER	WQZ9670	Chicago	0	0	1	1	89	63	44	34	36	24	0	0	292
EDWIN H. GOTT	WXQ4511	Chicago	0	0	0	0	25	24	0	18	19	8	0	0	94
EDYTH L	ZCAM4	Baltimore	44	45	58	54	69	69	66	22	53	18	0	0	498
EL FARO	WFJK	Jacksonville	0	0	0	22	27	30	30	50	3	0	0	0	162
EL MORRO	KCGH	Jacksonville	35	35	36	52	54	55	56	45	44	67	0	0	479
EL YUNQUE	WGJT	Jacksonville	32	26	38	63	73	1	45	44	32	44	0	0	398
ELATION	3FOC5	Miami	12	7	13	4	1	4	8	4	0	0	0	0	53
ELSEBETH	A8IO2	Anchorage	0	0	0	45	4	0	0	0	0	0	0	0	49
EMMA FOSS	WCF3931	Kodiak	0	0	6	47	67	42	72	86	0	0	0	0	320
EMPIRE STATE	KKFW	New York City	0	0	0	0	41	76	71	0	0	0	0	0	188
EMPRESS OF THE SEAS	C6SE6	Miami	4	4	0	0	6	20	5	2	4	12	0	0	57
ENDURANCE	WDA3359	Valdez	9	12	10	11	25	27	24	0	18	10	0	0	146
EVER DECENT	3FUO7	New York City	4	4	2	3	2	0	1	3	3	0	0	0	22
EVER DELIGHT	3FCB8	New York City	0	0	8	2	0	2	0	0	0	0	0	0	12
EVER DEVELOP	3FLF8	New York City	11	1	10	6	8	8	5	8	6	5	0	0	68
EVER DIADEM	3FOF8	New York City	0	1	2	1	0	0	5	4	0	0	0	0	13
EVER DIAMOND	3FQS8	New York City	0	0	0	0	0	0	0	11	6	6	0	0	23
EVER DIVINE	3FSA8	Norfolk	7	5	7	5	2	9	1	0	3	8	0	0	47
EVER GENTLE	3EFE9	Seattle	0	0	0	0	0	0	11	0	0	0	0	0	11
EVER RACER	3FJL4	New York City	0	0	0	0	0	0	1	3	4	0	0	0	8
EVER REACH	3FQO4	New York City	15	8	17	22	8	27	7	4	0	0	0	0	108
EVER RENOWN	3FFR4	Long Beach	12	7	8	5	1	0	0	2	6	6	0	0	47
EVER RESULT	3FSA4	New York City	0	0	0	0	6	4	3	0	0	0	0	0	13
EVER UBERTY	3FAG9	Seattle	0	0	0	0	0	14	0	10	0	0	0	0	24
EVER UNION	3FFG7	Seattle	21	11	10	15	3	0	0	0	0	0	0	0	60
EVER UNIQUE	3FXQ6	Seattle	0	0	0	1	1	0	0	0	32	4	0	0	38
EVER UNISON	3FTL6	Seattle	1	0	4	6	0	0	0	0	0	0	0	0	11
EVER UNITED	3FMQ6	Seattle	0	0	6	0	0	6	7	5	0	0	0	0	24
EVER URANUS	3FCA9	Seattle	7	0	0	2	0	3	5	0	0	0	0	0	17
EVER URBAN	3FXN9	Seattle	0	2	0	0	0	1	3	0	15	0	0	0	21

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EVER USEFUL	3FCC9	Anchorage	0	6	0	2	0	0	4	3	0	9	0	0	24
EVER UTILE	3FZA9	Seattle	0	0	0	0	4	0	0	0	0	0	0	0	4
EXPLORER OF THE SEAS	ELWX5	Miami	67	154	193	282	225	257	204	301	0	94	0	0	1777
FAIRWEATHER	WTEB	Anchorage	21	0	0	6	69	65	67	77	54	67	0	0	426
FASCINATION	C6FM9	Miami	2	0	0	5	6	9	1	0	0	5	0	0	28
FEDERAL HUNTER	VRWP2	New Orleans	0	0	12	3	0	0	0	0	0	0	0	0	15
FEDERAL MAAS	8POB	New Orleans	0	0	0	0	2	2	13	1	0	0	0	0	18
FIGARO	S6PI	Baltimore	0	0	22	30	0	0	0	0	0	0	0	0	52
FISHHAWK	WRB5085	Kodiak	0	0	0	0	33	3	0	1	29	0	0	0	66
FLYING-D	WYD9057	Kodiak	0	0	0	0	0	0	0	0	10	7	0	0	17
FRANCES L	ZCAM5	Baltimore	26	21	21	32	40	33	41	57	57	63	0	0	391
FREEDOM	WDB5483	Baltimore	0	0	15	43	38	33	38	41	29	14	0	0	251
FREMANTLE EXPRESS	VSXC7	Anchorage	3	0	0	10	8	12	11	7	0	11	0	0	62
GALAXY	C6FU6	Miami	0	0	0	6	0	0	0	0	0	0	0	0	6
GALE WIND	WAZ9548	Kodiak	0	0	0	8	20	11	11	13	18	16	0	0	97
GEMINI VOYAGER	C6FE5	Long Beach	8	28	9	0	0	0	72	25	34	34	0	0	210
GENE DUNLAP	WAS2433	Kodiak	0	1	1	0	0	0	0	0	2	2	0	0	6
GEYSIR	WCZ5528	Norfolk	10	0	24	37	44	55	46	27	36	45	0	0	324
GLADIATOR	WBN5982	Kodiak	0	0	0	0	0	0	0	5	2	0	0	0	7
GLADIATOR	WCZ9000	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
GLOBAL SENTINEL	V7KR4	Baltimore	0	0	0	3	0	0	0	0	0	0	0	0	3
GLOIRE	3FPA6	Seattle	64	57	0	70	52	0	0	0	0	0	0	0	243
GOLDEN BEAR	NMRY	Oakland	0	0	0	0	49	59	33	58	0	0	0	0	199
GORDON GUNTER	WTEO	New Orleans	0	0	140	92	164	71	146	137	134	133	0	0	1017
GREAT LAND	WFDP	Seattle	41	32	14	20	52	30	17	24	40	55	0	0	325
GREEN BRAZIL	V2RE	Baltimore	0	0	49	41	62	63	60	59	50	55	0	0	439
GREEN DALE	WCZ5238	Jacksonville	56	68	72	56	13	43	57	46	52	1	0	0	464
GREEN LAKE	WDDI	Baltimore	10	12	26	29	41	13	7	16	5	23	0	0	182
GREEN POINT	WCY4148	New York City	2	0	0	0	0	0	0	0	0	0	0	0	2
GRETA	WCY2853	Kodiak	0	0	0	0	13	3	0	0	0	0	0	0	16
GRETCHEN H.	WDC9138	Kodiak	0	0	0	5	11	3	1	4	7	36	0	0	67
GROTON	KMJL	New York City	12	4	15	23	3	0	0	35	19	33	0	0	144
GSF EXPLORER	WCX5333	New Orleans	0	42	40	4	48	80	30	35	26	22	0	0	327
GSF GRAND BANKS	YJUF7	Houston	0	0	0	0	0	0	0	0	0	198	0	0	198
GUARDIAN	WBO2511	Kodiak	0	0	1	0	0	0	0	0	1	0	0	0	2
GUARDSMAN	WBN5978	Kodiak	91	40	29	48	53	38	64	22	37	107	0	0	529
GULF TITAN	WDA5598	Kodiak	2	8	12	16	0	4	14	19	21	12	0	0	108
GYR FALCON	WCU6587	Kodiak	0	0	4	7	0	0	0	0	0	1	0	0	12
H. LEE WHITE	WZD2465	Chicago	0	0	0	0	10	0	0	0	2	1	0	0	13
HANJIN OTTAWA	DANM	Anchorage	86	69	83	57	46	32	28	31	19	17	0	0	468
HANJIN SHANGHAI	3FGI5	New York City	10	12	11	30	33	19	7	0	0	0	0	0	122
HANSA CENTURY	DHHI	New York City	17	4	0	0	0	0	0	0	0	0	0	0	21
HANSA RENDSBURG	A8CF4	Anchorage	80	78	88	73	70	55	78	32	17	23	0	0	594
HANSA VISBY	ELWR5	Anchorage	55	44	53	53	58	47	61	62	59	45	0	0	537
HARVEY GAMAGE	WCY2572	New York City	0	0	0	0	0	0	0	0	0	42	0	0	42
HASTU SMILE	MLTH5	Seattle	0	0	0	0	0	0	0	0	2	7	0	0	9
HATSU EAGLE	ZNZH6	Seattle	0	0	0	7	0	0	13	0	6	6	0	0	32
HATSU ELITE	VSJG7	Seattle	56	53	47	33	47	39	24	21	24	18	0	0	362
HATSU ENVOY	VSQL9	Seattle	21	14	0	16	19	20	0	16	12	15	0	0	133
HATSU ETHIC	VQFS4	Seattle	12	15	21	22	32	20	25	25	29	4	0	0	205
HATSU EXCEL	VSXV3	Seattle	17	12	19	16	18	14	20	25	5	0	0	0	146
HATSU SIGMA	MKKZ7	Seattle	10	7	15	11	9	3	4	8	21	18	0	0	106

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
HATSU SMART	MLBD9	Seattle	0	0	0	0	17	0	0	14	43	80	0	0	154
HELENKA B	WAH5520	Anchorage	0	0	0	0	0	0	0	6	5	1	0	0	12
HELSINKI EXPRESS	ZCDT8	Houston	0	0	0	0	0	0	0	0	0	2	0	0	2
HENRY GOODRICH	HP6038	Houston	0	0	0	0	0	221	236	233	229	225	0	0	1144
HERBERT C. JACKSON	WL3972	Chicago	0	0	0	0	0	0	9	14	0	0	0	0	23
HERCULES	WBN2074	Kodiak	0	0	0	42	25	19	38	0	0	0	0	0	124
HI'IALAKAI	WTEY	Honolulu	51	54	57	45	80	57	78	50	71	69	0	0	612
HMI BRENTON REEF	WCY8453	Anchorage	15	50	34	36	52	31	42	45	25	25	0	0	355
HONOR	WDC6923	Baltimore	11	17	36	7	16	28	31	28	8	24	0	0	206
HOOD ISLAND	C6LU4	Miami	27	38	46	43	43	57	36	42	32	62	0	0	426
HORIZON ENTERPRISE	KRGB	Oakland	508	601	671	356	682	652	693	535	503	679	0	0	5880
HORIZON ANCHORAGE	KGTX	Anchorage	196	170	198	189	199	278	266	232	203	231	0	0	2162
HORIZON CHALLENGER	WZJC	Jacksonville	82	75	86	48	59	43	65	76	45	56	0	0	635
HORIZON CONSUMER	WCHF	Long Beach	24	2	29	21	37	39	52	23	24	34	0	0	285
HORIZON CRUSADER	WZJF	Jacksonville	32	35	29	0	0	0	0	0	0	0	0	0	96
HORIZON DISCOVERY	WZJD	Jacksonville	38	19	2	25	44	42	34	41	18	42	0	0	305
HORIZON FAIRBANKS	WPGJ	Anchorage	57	62	61	34	0	47	32	27	0	0	0	0	320
HORIZON HAWAII	KIRF	New York City	69	50	70	40	62	75	62	35	30	79	0	0	572
HORIZON KODIAK	KGTZ	Anchorage	59	56	60	55	49	50	42	41	33	316	0	0	761
HORIZON NAVIGATOR	WPGK	Long Beach	50	39	65	38	34	49	52	35	30	45	0	0	437
HORIZON PACIFIC	WSRL	Long Beach	53	45	0	52	75	66	81	87	38	65	0	0	562
HORIZON PRODUCER	WJBJ	New York City	66	69	75	77	71	74	72	73	58	61	0	0	696
HORIZON RELIANCE	WFLH	Long Beach	6	63	85	74	90	83	73	74	66	116	0	0	730
HORIZON SPIRIT	WFLG	Oakland	47	55	64	74	81	76	77	70	75	53	0	0	672
HORIZON TACOMA	KGTY	Anchorage	124	63	59	70	65	55	49	43	41	46	0	0	615
HORIZON TRADER	KIRH	Oakland	57	44	60	69	65	74	38	48	51	73	0	0	579
HOUSTON	KCDK	Houston	52	9	6	17	22	0	3	3	0	0	0	0	112
HUAL SEOUL	LADO6	New York City	0	0	0	0	0	0	0	17	0	0	0	0	17
HYBUR TRADER	V2ZP5	Miami	0	0	0	0	0	0	4	7	2	2	0	0	15
HYUNDAI GARNET	9VVN	New York City	43	16	42	59	54	73	56	45	36	41	0	0	465
I.T. INTREPID	8PSH	Anchorage	0	0	0	108	85	0	77	166	123	109	0	0	668
IMAGINATION	C6FN2	Miami	0	6	26	20	20	7	0	12	15	38	0	0	144
INDEPENDENCE	WRYG	Baltimore	4	33	33	39	5	0	19	42	26	30	0	0	231
INDIAN OCEAN	C6T2063	New York City	33	29	9	12	8	37	22	19	34	22	0	0	225
INDIANA HARBOR	WXN3191	Chicago	0	0	10	79	123	139	158	159	127	135	0	0	930
INDOTRANS CELEBES	VRZN9	Norfolk	0	15	47	48	8	45	93	48	40	0	0	0	344
INDOTRANS JAVA	VRZN7	New Orleans	0	0	0	0	0	0	25	36	59	74	0	0	194
INDOTRANS MAKASSA	VRZO2	New Orleans	0	0	0	0	32	68	38	28	42	27	0	0	235
INDUSTRIAL CHALLENGER	WDHL	Norfolk	0	0	0	0	23	28	16	0	0	0	0	0	67
INLAND SEAS	WCJ6214	Chicago	0	0	0	0	2	0	0	0	0	0	0	0	2
INLET RESEARCH	KEC43	Anchorage	1	0	1	3	0	1	5	1	0	3	0	0	15
INSPIRATION	C6FM5	Anchorage	0	0	0	0	0	4	0	1	0	3	0	0	8
INTEGRITY	WDC6925	Baltimore	52	51	45	45	26	34	25	42	29	26	0	0	375
IRENES REMEDY	SYAQ	New York City	18	25	17	23	37	33	34	37	37	33	0	0	294
ISLAND CHAMPION	WCZ7046	Kodiak	0	1	0	2	1	0	0	0	0	0	0	0	4
ISLAND SCOUT	WDC6588	Kodiak	0	0	0	0	0	0	12	47	8	0	0	0	67
ISLAND WARRIOR	WDA9217	Kodiak	0	8	16	11	13	9	0	9	14	15	0	0	95
ITB BALTIMORE	WXKM	Baltimore	0	0	16	17	9	13	18	16	25	14	0	0	128
ITB JACKSONVILLE	WNDG	Baltimore	37	18	37	55	61	67	63	85	92	98	0	0	613
ITB NEW YORK	WVDG	Baltimore	4	27	26	19	18	28	16	19	9	20	0	0	186
IVER FOSS	WYE6442	Kodiak	0	0	0	0	0	0	0	0	0	3	0	0	3
J.A.W. IGLEHART	WTP4966	Chicago	0	0	0	0	26	8	9	8	0	0	0	0	51

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
JAMES R. BARKER	WYP8657	Chicago	66	0	37	154	150	99	188	189	138	125	0	0	1146
JEAN ANNE	WDC3786	New Orleans	71	45	35	42	82	75	41	57	76	63	0	0	587
JEFFREY FOSS	WCX4608	Kodiak	0	0	0	0	29	0	16	0	0	10	0	0	55
JENS MAERSK	OYYK2	New York City	23	16	1	74	64	62	43	37	35	9	0	0	364
JEPPESEN MAERSK	OWTW2	New York City	16	31	42	33	34	22	26	48	13	20	0	0	285
JOHN G. MUNSON	WE3806	Chicago	0	0	11	58	31	90	95	56	89	83	0	0	513
JOHN J. BOLAND	WZE4539	Chicago	0	0	0	7	17	5	0	0	0	3	0	0	32
JOHN N. COBB	WMVC	Anchorage	0	0	0	0	1	13	13	0	0	0	0	0	27
JOLLY ARANCIONE	IBYU	Unknown	9	27	9	21	15	0	0	0	0	0	0	0	81
JOLLY NERO	IBYS	Baltimore	0	0	0	3	0	0	0	0	0	0	0	0	3
JOSEPH L. BLOCK	WDA2768	Chicago	0	0	0	0	0	0	0	0	1	0	0	0	1
JUSTINE FOSS	WYL4978	Kodiak	0	0	1	0	0	9	0	0	0	0	0	0	10
JUTUL	LAVX5	Anchorage	32	18	9	0	0	0	0	0	0	0	0	0	59
KAINANI	WDC8819	Kodiak	0	0	0	0	0	0	0	14	0	0	0	0	14
KAPITAN AFANASYEV	P3XL7	Seattle	63	7	0	0	6	12	50	63	42	51	0	0	294
KAREN MAERSK	OZKN2	Seattle	56	23	0	0	0	19	6	0	30	26	0	0	160
KASIF KALKAVAN	V7IX7	Norfolk	0	0	0	0	0	25	15	10	13	0	0	0	63
KATHERINE	WUS5485	Valdez	0	0	0	0	0	1	1	0	0	0	0	0	2
KATRINE MAERSK	OZLL2	Seattle	9	5	3	15	4	0	6	15	3	0	0	0	60
KAUAI	WSRH	Long Beach	30	26	35	31	18	26	62	45	25	22	0	0	320
KAYE E. BARKER	WCF3012	Chicago	0	0	8	54	14	0	7	14	32	11	0	0	140
KENNICOTT	WCY2920	Kodiak	38	24	53	46	25	19	42	51	19	7	0	0	324
KILO MOANA	WDA7827	Honolulu	0	6	11	49	46	11	2	17	48	16	0	0	206
KIRSTEN MAERSK	OYDM2	Seattle	26	0	0	0	0	0	0	0	0	0	0	0	26
KIYI	KAO107	Chicago	0	0	0	0	0	5	0	0	0	0	0	0	5
KNORR	KCEJ	Jacksonville	10	23	22	18	0	0	0	0	0	0	0	0	73
KNUD MAERSK	OYBJ2	New York City	21	2	3	33	39	11	0	0	0	0	0	0	109
KODIAK	KQXZ	Valdez	0	0	0	0	0	0	0	5	0	0	0	0	5
KODIAK KING	WCE8949	Kodiak	0	0	0	0	0	0	5	1	1	0	0	0	7
KOTZEBUE RESEARCH	KUU619	Anchorage	0	0	0	0	16	21	23	30	26	25	0	0	141
LAUREN FOSS	WDB3834	Kodiak	0	0	12	0	0	45	57	0	17	0	0	0	131
LAZY BAY	WDB8266	Kodiak	0	0	0	0	0	0	0	0	1	0	0	0	1
LEGEND OF THE SEAS	C6SL5	Miami	24	23	12	10	0	0	0	0	0	0	0	0	69
LESLIE LEE	WYC7933	Valdez	0	4	0	0	0	0	0	0	0	0	0	0	4
LEYLA KALKAVAN	V7JG9	Norfolk	42	38	24	0	0	0	0	0	0	0	0	0	104
LIBERTY	WRYX	Baltimore	43	51	51	23	18	65	67	21	0	60	0	0	399
LIBERTY EAGLE	WHIA	Houston	4	41	0	32	2	0	0	0	13	45	0	0	137
LIBERTY GLORY	WADP	New Orleans	10	0	21	0	0	0	0	0	0	0	0	0	31
LIBERTY GRACE	WADN	New Orleans	2	30	57	0	56	6	0	0	51	27	0	0	229
LIBERTY SEA	C6UA5	New Orleans	3	7	8	0	0	0	0	0	46	5	0	0	69
LIBERTY SPIRIT	WCPU	New Orleans	16	40	15	0	1	2	43	11	23	33	0	0	184
LIBERTY STAR	WCBP	New Orleans	48	71	30	54	31	22	63	38	0	62	0	0	419
LIBERTY SUN	WCOB	New Orleans	0	31	3	90	3	43	35	8	26	35	0	0	274
LIBERTY WAVE	C6UG8	Houston	0	0	0	0	0	27	13	8	5	6	0	0	59
LIBRA SALVADOR	V2AD6	New York City	0	0	0	0	0	0	20	48	43	64	0	0	175
LIHUE	WTST	Oakland	10	48	55	0	24	0	11	17	0	0	0	0	165
LIVORNO EXPRESS	WABU	Houston	0	22	65	54	66	57	50	59	34	33	0	0	440
LNG CAPRICORN	V7BW8	New York City	42	59	60	51	85	81	84	86	75	71	0	0	694
LNG GEMINI	V7BW9	Anchorage	6	5	11	1	13	62	94	56	53	25	0	0	326
LNG LEO	V7BX2	New York City	14	5	18	34	52	28	16	3	9	23	0	0	202
LNG LIBRA	V7BX3	Anchorage	28	24	18	10	7	13	39	78	71	40	0	0	328
LNG TAURUS	V7BX4	New York City	56	10	29	38	29	14	6	21	28	19	0	0	250

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
LNG VIRGO	V7BX5	New York City	16	22	17	72	86	85	78	78	78	71	0	0	603
LOIS H.	WTD4576	Kodiak	0	0	0	0	0	0	23	7	31	52	0	0	113
LT GOING	IBTA	Seattle	0	0	0	7	7	7	0	0	0	0	0	0	21
LT UNICORN	3FZC9	Seattle	0	0	0	0	0	0	0	0	0	2	0	0	2
LT USODIMARE	IBPO	Seattle	0	0	0	0	0	0	0	3	0	0	0	0	3
LURLINE	WLVD	Oakland	32	48	50	47	43	28	29	24	8	12	0	0	321
M/V PRAIRIE SKY	3FXK4	New Orleans	0	0	0	0	0	12	72	18	12	29	0	0	143
M/V STEPHAN-J	V2JN	Miami	68	53	73	73	70	0	0	0	0	0	0	0	337
MAASDAM	PFRO	Miami	80	51	49	8	32	11	56	51	39	63	0	0	440
MACKINAC BRIDGE	JKES	New York City	52	40	37	33	33	28	39	41	33	39	0	0	375
MADISON MAERSK	OVJB2	Oakland	64	37	36	37	86	97	37	22	4	27	0	0	447
MAERSK ARKANSAS	WDB9984	Baltimore	0	0	29	56	44	65	56	40	54	59	0	0	403
MAERSK CAROLINA	WBDS	Charleston	31	40	27	15	24	32	26	31	25	20	0	0	271
MAERSK CONSTELLATION	WRYJ	Houston	58	10	15	0	21	2	7	78	20	49	0	0	260
MAERSK DAMMAM	V2OE3	Oakland	7	8	14	1	53	20	27	29	14	3	0	0	176
MAERSK DJIBOUTI	A8JM8	Norfolk	0	0	0	0	0	0	0	8	0	0	0	0	8
MAERSK DORTMUND	9HZX7	New York City	0	0	0	0	0	0	0	4	4	8	0	0	16
MAERSK DUBLIN	V2OE1	New York City	0	0	0	0	41	23	17	3	0	0	0	0	84
MAERSK GEORGIA	WAHP	New York City	22	21	25	22	16	0	4	2	13	6	0	0	131
MAERSK MAINE	WAUY	New York City	32	37	47	46	33	50	42	36	24	21	0	0	368
MAERSK MARYLAND	WAUU	New York City	11	0	0	32	28	48	27	3	13	18	0	0	180
MAERSK MISSOURI	WAHV	Norfolk	22	4	25	12	2	45	25	14	44	0	0	0	193
MAERSK NANHAI	C4AA2	New York City	0	0	0	0	0	0	0	0	0	1	0	0	1
MAERSK NANTES	V2OO7	New York City	0	0	0	0	0	0	30	42	50	68	0	0	190
MAERSK NEUSTADT	C4AH2	Seattle	0	1	0	0	0	0	0	0	0	0	0	0	1
MAERSK NEVADA	WMLG	Norfolk	20	19	25	25	36	11	22	23	40	24	0	0	245
MAERSK NEWARK	A8CF2	New York City	18	16	18	11	12	0	0	0	0	9	0	0	84
MAERSK PATRAS	MYSU5	Seattle	0	0	0	0	0	0	60	53	46	23	0	0	182
MAERSK PECEM	V2OU9	Charleston	0	0	0	0	0	0	0	0	18	28	0	0	46
MAERSK SUN	S6ES	Seattle	13	0	0	23	48	36	24	16	41	6	0	0	207
MAERSK VALENCIA	DAPG	New York City	10	9	13	7	8	9	43	26	47	60	0	0	232
MAERSK VERMONT	WAUW	New York City	27	26	58	34	34	6	55	27	28	46	0	0	341
MAERSK VIRGINIA	WAHK	Norfolk	4	25	14	8	6	0	0	0	0	3	0	0	60
MAERSK WAVE	S6TV	Baltimore	7	4	0	1	3	4	10	10	27	22	0	0	88
MAERSK WIND	S6TY	Baltimore	28	4	2	35	51	53	44	45	28	46	0	0	336
MAGLEBY MAERSK	OUSH2	New York City	21	4	29	41	38	27	32	24	46	25	0	0	287
MAHIMAHI	WHRN	Oakland	55	22	49	38	24	48	52	31	16	29	0	0	364
MAIA H.	WYX2079	Kodiak	0	0	1	16	0	28	8	0	0	12	0	0	65
MAJESTIC MAERSK	OUJH2	New York City	27	40	34	24	30	41	17	35	24	28	0	0	300
MANOA	KDBG	Oakland	47	38	59	34	35	39	37	55	55	60	0	0	459
MANUKAI	WRGD	New York City	37	31	4	6	5	0	7	25	28	24	0	0	167
MANULANI	WDC4696	New York City	50	43	47	57	63	63	67	55	64	63	0	0	572
MARCY J	WCF4791	Valdez	0	0	8	0	0	0	0	0	0	0	0	0	8
MAREN MAERSK	OWZU2	Long Beach	38	29	30	34	28	42	26	35	25	40	0	0	327
MARGRETHE MAERSK	OYSN2	Long Beach	41	14	23	18	11	0	51	41	32	22	0	0	253
MARIA ANGELICOUSSIS	C6FP2	Long Beach	0	0	0	0	0	0	0	7	0	0	0	0	7
MARIE MAERSK	OULL2	New York City	38	47	55	64	42	25	46	41	32	27	0	0	417
MARIELLE BOLTEN	ELZH9	New York City	6	0	0	0	0	0	0	0	0	0	0	0	6
MARINER OF THE SEAS	C6FV9	Jacksonville	0	0	0	0	0	9	30	10	2	1	0	0	52
MARK HANNAH	WYZ5243	Chicago	0	0	0	8	5	1	0	0	0	0	0	0	14
MARLIN	6ZXG	New Orleans	77	65	59	27	32	43	68	69	60	34	0	0	534
MARSEILLE STAR	9HCH7	New York City	0	0	0	0	0	0	0	34	18	18	0	0	70

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
MARY ANN HUDSON	KSDF	Houston	42	28	45	51	41	6	0	49	3	41	0	0	306
MATANUSKA	WN4201	Kodiak	1	8	4	19	25	24	51	47	19	5	0	0	203
MATHILDE MAERSK	OUUU2	Long Beach	21	8	8	17	25	3	40	36	22	37	0	0	217
MATSONIA	KHRC	Oakland	50	45	45	54	61	51	36	9	0	24	0	0	375
MAUI	WSLH	Long Beach	46	0	0	21	20	0	0	0	0	0	0	0	87
MAUMEE	WDA4649	Chicago	0	0	0	0	5	31	29	28	27	40	0	0	160
MAUNALEI	KFMV	Baltimore	0	0	0	0	0	0	0	10	6	10	0	0	26
MAUNAWILI	WDB7104	New York City	44	10	22	43	43	17	29	64	38	38	0	0	348
MAYVIEW MAERSK	OWEB2	Oakland	38	13	0	25	42	26	30	26	40	45	0	0	285
MCARTHUR II	WTEJ	Seattle	0	0	55	98	120	102	138	180	163	189	0	0	1045
MCKEE SONS	WCZ9703	Chicago	23	0	27	40	33	57	55	69	77	72	0	0	453
MC-KINNEY MAERSK	OUZW2	New York City	4	28	10	39	7	10	24	28	28	45	0	0	223
MELVILLE	WECB	Long Beach	0	0	29	82	40	10	19	30	23	5	0	0	238
MERCURY	C6SQ6	Miami	7	3	0	0	0	0	0	8	9	9	0	0	36
MERKUR	PJTA	New York City	681	374	0	0	0	0	0	0	0	0	0	0	1055
MESABI MINER	WYQ4356	Chicago	40	0	15	39	20	49	31	7	23	41	0	0	265
METTE MAERSK	OXKT2	Long Beach	40	23	23	47	29	47	43	32	58	41	0	0	383
MICHAEL O'LEARY	WCP9556	Kodiak	0	0	0	0	0	1	7	0	0	0	0	0	8
MICHIGAN	WRB4141	Chicago	0	0	0	5	2	1	1	0	1	0	0	0	10
MIDDLETOWN	WR3225	Chicago	5	0	0	14	13	0	0	0	0	0	0	0	32
MIDNIGHT SUN	WAHG	Seattle	115	14	74	92	115	40	50	184	255	186	0	0	1125
MILLER FREEMAN	WTDM	Seattle	0	111	164	128	164	195	208	169	186	113	0	0	1438
MISS MARY	WDB3095	Valdez	0	0	0	0	3	0	0	0	14	0	0	0	17
MISS ROXANNE	WCX4992	Valdez	0	0	0	0	12	7	0	0	11	2	0	0	32
MOBILE	KXDB	New York City	24	3	0	0	0	14	17	4	4	7	0	0	73
MOKIHANA	WNRD	Oakland	37	30	27	59	50	34	31	36	51	39	0	0	394
MOKU PAHU	WBWK	Oakland	27	5	12	3	11	25	42	16	0	25	0	0	166
MOL COMMITMENT	9VID2	Charleston	13	53	32	23	24	0	2	3	38	6	0	0	194
MOL INNOVATION	9VVP	Charleston	47	58	69	61	47	63	70	48	53	44	0	0	560
MOL VELOCITY	9VVK	Seattle	41	0	24	26	31	50	74	41	72	44	0	0	403
MONTAUK	WDCJ	New Orleans	45	52	60	81	77	24	66	93	51	75	0	0	624
MSC DONATA	A8EU2	Anchorage	9	0	0	34	44	55	57	38	39	49	0	0	325
MSC ELENA	HPAU	New York City	0	3	15	6	12	25	24	22	14	0	0	0	121
MSC EMMA	HPXB	New York City	0	0	0	0	0	3	0	1	5	0	0	0	9
MSC MATILDE	HODP	New York City	19	20	43	39	59	4	45	1	4	0	0	0	234
MSC ULSAN	C6SV2	New York City	14	28	29	26	42	13	0	0	0	0	0	0	152
NANCY FOSTER	WTER	Norfolk	0	0	47	37	30	13	45	33	25	54	0	0	284
NANUQ	WCY8498	Valdez	2	2	0	0	0	0	0	0	0	0	0	0	4
NARRAGANSETT BAY	NL9H	Kodiak	36	16	69	54	60	80	54	35	36	14	0	0	454
NATOMA	WBB5799	Kodiak	4	7	0	0	0	1	0	0	0	0	0	0	12
NAVAJO	WCT5737	Kodiak	3	8	0	0	0	1	0	0	0	0	0	0	12
NAVIGATOR	WBO3345	Kodiak	0	0	0	0	0	0	0	0	87	101	0	0	188
NAVIGATOR OF THE SEAS	C6FU4	Miami	21	24	22	18	1	0	0	0	0	0	0	0	86
NEW HORIZON	WKWB	Long Beach	0	0	0	12	0	0	0	6	1	1	0	0	20
NOAA SHIP KA'IMIMOANA	WTEU	Honolulu	76	35	0	88	41	98	102	51	62	87	0	0	640
NOORDAM	PHET	Anchorage	0	27	21	3	2	5	51	91	172	106	0	0	478
NORASIA ATLAS	A8GX4	New York City	2	4	3	9	35	9	9	12	10	9	0	0	102
NORASIA SILS	HBDF	New York City	0	2	0	0	0	0	0	0	0	0	0	0	2
NORCOASTER	WYP7276	Valdez	0	0	0	0	0	0	0	0	1	0	0	0	1
NORTH STAR	KIYI	Seattle	55	12	47	60	49	15	15	22	30	33	0	0	338
NORTHERN VICTOR	WCZ6534	Kodiak	8	0	3	9	0	45	30	38	18	26	0	0	177
NORTHWEST EXPLORER	WCZ9007	Kodiak	0	0	0	0	0	7	5	5	3	0	0	0	20

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
NORWEGIAN STAR	C6FR3	Anchorage	0	0	0	0	25	25	15	23	0	0	0	0	88
NORWEGIAN SUN	C6RN3	Anchorage	0	0	0	0	0	17	22	25	16	0	0	0	80
NORWEGIAN WIND	C6LG6	Miami	0	0	0	0	10	18	27	32	15	0	0	0	102
NOVA TERRA	C6IZ7	Miami	4	25	43	23	35	56	39	60	59	12	0	0	356
NUNANIQ	WRC2049	Kodiak	0	0	0	0	0	2	0	0	6	7	0	0	15
OCEAN MARINER	WCF3990	Kodiak	0	0	0	0	2	29	31	39	0	3	0	0	104
OCEAN NAVIGATOR	WSC2552	Kodiak	0	0	2	0	0	0	0	2	1	1	0	0	6
OCEAN PREFACE	VRUL7	New Orleans	0	0	0	0	0	1	3	1	0	0	0	0	5
OCEAN RANGER	WAM7635	Kodiak	0	0	0	0	8	42	37	75	21	59	0	0	242
OCEAN RELIANCE	WADY	Kodiak	19	3	0	11	9	8	1	5	7	6	0	0	69
OCEAN TITAN	WDC7175	Jacksonville	53	35	81	19	7	6	15	27	11	39	0	0	293
OCEAN TITAN	WDB9647	Kodiak	0	5	1	0	8	0	0	3	3	0	0	0	20
OCEANA	ZCDN9	Anchorage	0	0	0	4	0	8	9	9	0	3	0	0	33
OLEANDER	PJJU	New York City	8	10	4	3	13	10	6	4	0	2	0	0	60
OLIVIA MAERSK	OXKO2	Miami	35	15	21	42	19	0	0	0	0	0	0	0	132
OLUF MAERSK	OXFU2	New York City	0	0	0	0	4	0	0	0	0	0	0	0	4
OOCL AMERICA	VRWE8	Seattle	19	21	16	24	29	21	21	22	17	25	0	0	215
OOCL CALIFORNIA	VRWC8	Seattle	31	15	4	0	23	6	3	8	10	3	0	0	103
OOCL CHINA	VRWE7	Anchorage	0	0	0	0	0	0	0	0	24	19	0	0	43
OOCL FAIR	VRWB8	Long Beach	6	15	19	27	38	40	25	35	21	25	0	0	251
OOCL FIDELITY	VRWG5	Long Beach	9	3	10	14	8	28	45	32	36	24	0	0	209
OOCL FRIENDSHIP	VRWD3	Long Beach	8	24	23	15	16	15	12	21	14	6	0	0	154
OOCL NETHERLANDS	VRVN6	Long Beach	21	14	6	24	16	17	42	36	24	35	0	0	235
OOCL TIANJIN	VRAR7	Anchorage	19	14	19	4	20	29	16	13	24	23	0	0	181
OOSTERDAM	PBKH	Anchorage	1	3	0	1	23	26	0	1	0	0	0	0	55
ORANGE STAR	ELFS7	New York City	77	55	60	49	61	63	64	75	52	66	0	0	622
ORANGE WAVE	ELPX7	New York City	83	52	64	71	86	56	37	24	70	73	0	0	616
OREGON II	WTDO	New Orleans	0	59	71	66	44	0	0	0	46	53	0	0	339
ORION VOYAGER	C6MC5	Baltimore	0	0	18	13	8	1	0	7	9	6	0	0	62
ORKUN KALKAVAN	V7JB8	Norfolk	0	0	0	0	0	0	0	0	0	19	0	0	19
ORTO	3FFJ7	Seattle	0	0	0	0	0	0	0	0	22	7	0	0	29
OSCAR DYSON	WTEP	Anchorage	0	0	0	31	48	14	89	0	13	0	0	0	195
OSCAR ELTON SETTE	WTEE	Jacksonville	38	71	73	29	38	44	33	44	16	112	0	0	498
OURO DO BRASIL	ELPP9	Baltimore	22	7	34	5	23	50	33	44	0	0	0	0	218
OVERSEAS AMBERMAR	WDC7019	Norfolk	0	0	0	8	0	0	0	0	0	17	0	0	25
OVERSEAS GALENA BAY	WGZK	Valdez	0	0	0	0	0	0	0	2	1	0	0	0	3
OVERSEAS HARRIETTE	WRFJ	Houston	8	0	9	5	35	59	54	38	6	1	0	0	215
OVERSEAS JOYCE	WUQL	Jacksonville	34	13	20	21	6	7	26	22	23	6	0	0	178
OVERSEAS MARILYN	WFQB	Houston	20	12	0	20	9	31	39	32	28	36	0	0	227
OVERSEAS NEW ORLEANS	WFKW	Houston	0	20	36	19	25	0	13	26	35	15	0	0	189
OVERSEAS PHILADELPHIA	WGDB	Miami	22	21	11	5	9	7	14	11	7	9	0	0	116
OVERSEAS PUGET SOUND	WXBZ	Valdez	7	2	0	0	0	0	8	5	2	0	0	0	24
PACIFIC CHALLENGER	WDC7518	Kodiak	2	233	139	277	226	188	360	116	260	414	0	0	2215
PACIFIC EXPLORER	V7DN3	Houston	0	0	0	0	0	0	7	52	64	36	0	0	159
PACIFIC PRIDE	WDC7515	Kodiak	0	0	0	0	0	44	48	39	1	118	0	0	250
PACIFIC RAVEN	WDC7505	Kodiak	0	0	0	0	0	46	24	18	18	9	0	0	115
PACIFIC RELIANCE	WDC9368	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
PACIFIC STAR	WCW7740	Valdez	1	0	3	1	0	0	0	0	0	0	0	0	5
PANDALUS	WAV7611	Anchorage	0	0	0	0	0	0	8	4	0	0	0	0	12
PARADISE	3FOB5	Miami	0	34	16	0	0	0	0	0	0	0	0	0	50
PARAGON	WDC7523	Kodiak	4	50	55	11	36	31	26	14	15	20	0	0	262
PATHFINDER	WBN8467	Valdez	35	16	8	6	32	7	33	20	10	0	0	0	167

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
PATRIOT	WQVY	Baltimore	27	31	16	21	31	0	24	28	34	64	0	0	276
PAUL R. TREGURTHA	WYR4481	Chicago	81	0	14	72	75	112	86	94	85	85	0	0	704
PHILADELPHIA	KSYP	Miami	25	4	5	12	19	2	22	28	6	8	0	0	131
PHILADELPHIA EXPRESS	WDC6736	Houston	123	113	133	141	73	104	104	116	83	97	0	0	1087
PHILIP R. CLARKE	WE3592	Chicago	0	0	15	80	112	160	203	243	398	236	0	0	1447
PHOENIX VOYAGER	C6QE3	Oakland	28	31	47	0	17	25	19	12	6	3	0	0	188
PHYLLIS DUNLAP	WDA6552	Kodiak	136	31	0	0	0	0	0	0	0	0	0	0	167
PICTON CASTLE	ZKWP	Anchorage	33	29	0	36	22	2	0	0	0	0	0	0	122
POINT BARROW	WBM5088	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
POLAR ADVENTURE	WAZV	New Orleans	15	25	21	26	29	20	35	30	22	21	0	0	244
POLAR ALASKA	KSBK	Valdez	17	34	24	30	23	61	49	18	27	38	0	0	321
POLAR CALIFORNIA	WMCV	Long Beach	9	20	32	23	17	6	0	0	0	2	0	0	109
POLAR DISCOVERY	WACW	New Orleans	13	13	0	0	21	26	30	15	10	10	0	0	138
POLAR EAGLE	ELPT3	Anchorage	181	139	147	133	137	120	141	120	35	97	0	0	1250
POLAR ENDEAVOUR	WCAJ	New Orleans	30	30	34	22	21	44	26	28	25	6	0	0	266
POLAR ENTERPRISE	WRTF	New Orleans	0	0	0	0	0	0	19	0	0	0	0	0	19
POLAR RANGER	WDC8652	Kodiak	0	0	1	16	54	15	10	2	5	1	0	0	104
POLAR RESOLUTION	WDJK	New Orleans	96	74	74	96	83	107	228	81	21	39	0	0	899
PREMIUM DO BRASIL	A8BL4	Baltimore	4	3	9	2	0	0	0	22	113	125	0	0	278
PRESIDENT ADAMS	WRYW	Long Beach	44	49	67	1	0	0	0	0	1	1	0	0	163
PRESIDENT GRANT	WCY2098	Long Beach	38	3	0	0	0	0	0	0	0	0	0	0	41
PRESIDENT JACKSON	WRYC	Seattle	7	40	49	55	27	43	42	37	34	44	0	0	378
PRESIDENT POLK	WRYD	Long Beach	54	2	10	53	57	65	44	34	23	56	0	0	398
PRESIDENT TRUMAN	WNDP	Seattle	30	45	33	13	26	31	37	21	27	42	0	0	305
PRESIDENT WILSON	WCY3438	Long Beach	33	43	0	0	0	0	0	0	0	0	0	0	76
PRESQUE ISLE	WZE4928	Chicago	6	0	4	32	8	24	58	37	50	73	0	0	292
PRIDE OF BALTIMORE II	WUW2120	Baltimore	0	0	48	79	23	30	45	7	19	21	0	0	272
PRINCE WILLIAM SOUND	WSDX	Valdez	0	0	0	15	39	7	0	0	19	37	0	0	117
PRINSENDAM	PBGH	Anchorage	18	3	0	9	50	31	26	51	31	84	0	0	303
PT. OLIKTOK	WBM5091	Kodiak	0	0	0	0	32	46	0	0	8	13	0	0	99
PT. THOMPSON	WBM5092	Kodiak	0	0	0	0	0	0	0	96	89	124	0	0	309
PURITAN	ZCDH9	Miami	37	37	38	12	3	41	26	5	46	38	0	0	283
PUSAN SENATOR	DQVG	Seattle	38	15	16	19	12	4	0	13	23	36	0	0	176
R.J. PFEIFFER	WRJP	Long Beach	6	4	1	0	0	0	0	1	0	0	0	0	12
R/V ENDEAVOR	WCE5063	New York City	0	0	19	13	6	1	5	13	2	4	0	0	63
RAINIER	WTEF	Seattle	0	0	0	49	74	72	77	82	26	48	0	0	428
REDEEMER	WDA8432	Kodiak	0	0	0	0	2	8	18	0	0	0	0	0	28
REDOUBT	WCG3013	Kodiak	0	0	0	0	0	0	4	0	7	0	0	0	11
REGAL PRINCESS	ZCBU4	Anchorage	0	0	0	0	6	3	1	16	20	21	0	0	67
REGINA MAERSK	OZIN2	New York City	47	52	33	31	27	23	17	8	5	3	0	0	246
RESERVE	WDC9724	Chicago	0	0	0	0	0	0	0	0	0	5	0	0	5
RESOLVE	WCZ5535	Baltimore	12	26	33	1	37	0	0	9	9	56	0	0	183
RHAPSODY OF THE SEAS	C6UA2	Houston	0	0	18	16	41	18	2	1	0	0	0	0	96
RHINE FOREST	V7EI9	New Orleans	61	41	69	61	56	49	62	61	66	61	0	0	587
RICHARD G MATTHIESEN	NBBP	Jacksonville	0	7	0	0	0	0	0	0	0	0	0	0	7
RICKMERS HAMBERG	V7DS3	New Orleans	17	3	21	2	3	0	8	0	0	1	0	0	55
ROBERT C. SEAMENS	WDA4486	Kodiak	5	21	50	82	36	5	0	0	0	17	0	0	216
ROGER BLOUGH	WZP8164	Chicago	0	0	0	7	42	11	9	0	3	0	0	0	72
ROGER REVELLE	KAOU	Long Beach	68	90	70	46	49	24	46	10	0	19	0	0	422
RONALD H. BROWN	WTEC	New Orleans	0	24	86	56	98	74	66	40	26	73	0	0	543
ROTTERDAM	PDGS	Anchorage	24	89	29	49	47	16	13	11	4	15	0	0	297
ROUGHNECK	WTW9262	Kodiak	0	0	0	0	3	0	0	0	0	0	0	0	3

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ROWAN GORILLA VI	WCZ6545	Anchorage	0	0	0	0	0	217	213	229	216	189	0	0	1064
RUBIN PEARL	YJQA8	Seattle	46	25	55	40	40	57	50	52	0	6	0	0	371
RYNDAM	PHFV	Miami	13	25	1	9	5	4	31	78	66	37	0	0	269
S/R BAYTOWN	KFPM	Valdez	22	13	0	12	22	26	30	0	14	8	0	0	147
S/R WILMINGTON	WBVZ	Houston	11	8	20	28	10	9	8	32	18	0	0	0	144
SAFMARINE ILLOVO	A8HJ8	New York City	22	29	19	49	24	101	53	72	72	79	0	0	520
SAFMARINE ZAMBEZI	A8CE9	New York City	0	0	0	0	18	17	9	6	15	42	0	0	107
SAIPEM 7000	C6NO5	Anchorage	0	0	0	0	0	0	0	181	135	16	0	0	332
SAKURA	V2AK3	New York City	45	31	41	16	25	28	29	5	0	1	0	0	221
SALISHAN	WUT4384	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
SALLY MAERSK	OZHS2	Seattle	0	2	0	8	3	0	0	0	14	10	0	0	37
SAM M. TAALAK	WCX5321	Kodiak	0	0	0	0	0	0	0	0	0	1	0	0	1
SAMSON MARINER	WCN3586	Kodiak	4	2	23	0	2	8	3	3	18	7	0	0	70
SANDRA FOSS	WYL4908	Kodiak	0	0	9	12	20	7	22	0	2	20	0	0	92
SANTA BARBARA	MGYF6	Seattle	27	18	31	40	45	42	49	54	47	44	0	0	397
SARGASSO	H9YR	Houston	6	8	9	10	8	0	1	16	3	0	0	0	61
SAUDI ABHA	HZRX	Baltimore	8	44	43	27	30	24	13	41	43	39	0	0	312
SAUDI DIRIYAH	HZZB	Houston	0	19	49	51	1	1	29	9	18	9	0	0	186
SAUDI HOFUF	HZZC	Houston	6	21	31	3	10	15	21	33	10	11	0	0	161
SAUDI TABUK	HZZD	Houston	55	64	44	64	37	5	49	0	18	25	0	0	361
SCHACKENBORG	ZCIH7	Houston	79	25	33	38	36	29	15	58	49	24	0	0	386
SEA HAWK	WDC7527	Kodiak	0	0	0	0	0	0	0	1	0	0	0	0	1
SEA PRINCE	WYT8569	Kodiak	14	40	6	0	64	27	49	41	40	54	0	0	335
SEA RELIANCE	WEOB	Kodiak	50	19	10	0	17	4	13	3	1	0	0	0	117
SEA STORM	WCV9132	Valdez	0	0	0	0	0	1	0	0	0	0	0	0	1
SEA VALIANT	WBN9213	Kodiak	0	0	0	0	0	0	1	0	0	0	0	0	1
SEA VICTORY	WCY6777	Kodiak	0	0	0	0	0	0	5	86	44	0	0	0	135
SEA VIKING	WCE8951	Kodiak	0	0	0	0	22	9	12	19	7	22	0	0	91
SEA VOYAGER	WCX9106	Valdez	0	0	0	0	0	0	0	0	0	30	0	0	30
SEABULK AMERICA	WWYY	Anchorage	83	40	54	87	87	67	75	93	81	102	0	0	769
SEABULK ARCTIC	WCY7054	Anchorage	28	13	28	33	16	12	18	13	27	19	0	0	207
SEABULK MARINER	WCY7053	Anchorage	0	0	0	0	0	0	1	19	0	0	0	0	20
SEABULK MONTANA	WCW9126	Anchorage	0	0	1	8	0	0	0	0	0	0	0	0	9
SEABULK NEVADA	WCY2306	Anchorage	107	139	192	95	187	202	160	143	182	144	0	0	1551
SEABULK PRIDE	WCY7052	Anchorage	34	18	4	31	42	44	22	33	22	23	0	0	273
SEABULK TRADER	KNJK	Miami	6	12	3	17	9	4	19	25	17	24	0	0	136
SEA-LAND ACHIEVER	WPKD	Houston	66	34	34	65	55	52	29	29	39	41	0	0	444
SEA-LAND ATLANTIC	KRLZ	Houston	55	41	52	52	32	44	56	37	24	55	0	0	448
SEA-LAND CHAMPION	MCDZ2	Oakland	23	29	45	53	43	46	39	69	39	8	0	0	394
SEA-LAND CHARGER	WDB9948	Long Beach	0	0	0	0	29	35	46	22	5	49	0	0	186
SEA-LAND COMET	WDB9950	Norfolk	59	45	42	44	30	30	28	50	43	36	0	0	407
SEA-LAND COMMITMENT	KRPB	Houston	62	59	141	121	189	194	121	21	53	62	0	0	1023
SEA-LAND DEFENDER	V7HX4	Oakland	0	30	38	34	31	0	0	0	0	0	0	0	133
SEA-LAND DEVELOPER	V7HZ7	Seattle	0	0	59	31	0	19	39	52	21	54	0	0	275
SEA-LAND EAGLE	MCDZ9	Long Beach	64	25	20	0	48	45	51	33	30	29	0	0	345
SEA-LAND EXPLORER	V7IP9	Long Beach	0	0	0	0	0	0	0	35	23	4	0	0	62
SEA-LAND EXPRESS	V7HH7	Seattle	60	39	38	22	52	32	32	15	0	0	0	0	290
SEA-LAND FLORIDA	KRHX	Houston	73	46	65	76	70	79	68	62	62	61	0	0	662
SEA-LAND INNOVATOR	V7IA8	Seattle	11	24	6	26	0	23	2	11	8	6	0	0	117
SEA-LAND INTEGRITY	V7IP8	Houston	10	45	17	22	2	3	5	46	34	54	0	0	238
SEA-LAND INTREPID	WDB9949	Charleston	44	0	27	45	44	30	7	7	14	39	0	0	257
SEA-LAND LIBERATOR	V7IQ2	Charleston	64	51	44	39	41	11	16	26	35	52	0	0	379

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SEA-LAND MERCURY	MCDW9	Oakland	53	43	65	47	6	0	40	40	32	44	0	0	370
SEA-LAND METEOR	WDB9951	Long Beach	57	10	41	18	26	25	32	11	38	43	0	0	301
SEA-LAND MOTIVATOR	WAAH	Houston	55	46	97	74	87	93	105	104	56	69	0	0	786
SEA-LAND PERFORMANCE	KRPD	Houston	35	55	61	49	55	54	61	58	28	56	0	0	512
SEA-LAND PRIDE	WDB9444	Houston	102	67	66	68	87	57	53	41	33	76	0	0	650
SEA-LAND QUALITY	KRNJ	Houston	90	51	40	45	30	57	40	52	24	27	0	0	456
SEA-LAND RACER	MCDW2	Charleston	18	5	27	19	10	0	0	0	8	21	0	0	108
SEASPAN QUEEN	CY7444	Kodiak	0	0	0	0	0	0	0	30	11	0	0	0	41
SELMA KALKAVAN	V7GX5	Norfolk	55	66	31	56	65	55	50	35	37	36	0	0	486
SENECA	WBN8469	Kodiak	0	0	5	58	39	25	29	19	3	2	0	0	180
SHEILA MCDEVITT	WDA4069	New Orleans	0	0	0	0	9	22	15	17	33	52	0	0	148
SIDNEY FOSS	WYL5445	Kodiak	19	2	3	0	17	12	12	4	18	3	0	0	90
SIERRA	WSNB	Valdez	62	64	8	0	0	0	0	0	11	10	0	0	155
SIKU	WCQ6174	Kodiak	0	0	0	0	49	47	49	15	14	36	0	0	210
SILKEBORG	EIJV	Houston	34	19	19	0	0	0	0	0	0	0	0	0	72
SILKEBORG	ZDHH7	Houston	0	0	0	74	83	80	81	81	69	14	0	0	482
SINE MAERSK	OZOK2	Seattle	75	0	11	18	0	50	0	17	28	0	0	0	199
SINUK	WCQ8110	Kodiak	0	0	0	59	180	217	221	94	193	209	0	0	1173
SIOUX	WBN7617	Kodiak	0	0	0	0	2	21	1	123	82	67	0	0	296
SKANDERBORG	ZCIG4	Houston	0	0	14	0	0	0	0	0	0	0	0	0	14
SKODSBORG	ZCIJ7	Baltimore	79	27	25	21	5	0	32	25	6	25	0	0	245
SNOHOMISH	WDB9022	Kodiak	0	0	0	0	2	15	7	1	21	24	0	0	70
SOFIE MAERSK	OZUN2	Seattle	20	0	67	0	33	19	0	69	0	32	0	0	240
SOL DO BRASIL	ELQQ4	Baltimore	2	0	1	8	1	0	22	1	0	24	0	0	59
SOROE MAERSK	OYKJ2	Seattle	32	26	0	0	28	0	17	23	2	13	0	0	141
SOUND RELIANCE	WXAE	Kodiak	12	28	12	26	9	46	4	0	0	0	0	0	137
SPIRIT OF MASSACHUSETTS	WCZ9474	New York City	0	0	0	13	0	0	0	0	0	0	0	0	13
SPIRIT OF OCEANUS	C6PJ8	Anchorage	0	0	0	0	0	2	0	0	0	0	0	0	2
SS BADGER	WBD4889	Chicago	0	0	0	0	0	15	43	52	54	22	0	0	186
ST LOUIS EXPRESS	WDD3825	Houston	0	0	0	0	0	0	0	0	0	2	0	0	2
ST NICHOLAS	WDB8066	Valdez	0	0	0	0	13	0	0	3	18	6	0	0	40
ST PAUL RESEARCH	KEY796	Anchorage	4	1	0	0	0	0	0	0	0	0	0	0	5
ST. CLAIR	WZA4027	Chicago	0	0	0	45	5	0	0	0	0	0	0	0	50
ST. MARYS CHALLENGER	WDB9135	Chicago	0	0	0	7	49	39	53	7	10	3	0	0	168
STACEY FOSS	WYL4909	Kodiak	0	0	0	0	0	8	12	0	0	6	0	0	26
STAR ALABAMA	LAVU4	Baltimore	16	0	17	14	15	14	4	0	3	2	0	0	85
STAR AMERICA	LAVV4	Jacksonville	23	14	20	44	31	0	0	29	49	56	0	0	266
STAR EAGLE	LAWO2	Baltimore	26	24	26	59	1	0	0	0	0	0	0	0	136
STAR EVVIVA	LAHE2	Jacksonville	0	17	24	19	8	15	0	0	0	0	0	0	83
STAR FLORIDA	LAVW4	Houston	17	2	12	6	0	43	0	35	0	17	0	0	132
STAR GEIRANGER	LAKQ5	Seattle	47	44	44	35	41	35	43	20	23	27	0	0	359
STAR GRAN	LADR4	Long Beach	0	0	0	0	27	10	0	27	0	24	0	0	88
STAR GRINDANGER	LAKR5	Seattle	0	0	39	35	1	0	4	45	24	47	0	0	195
STAR HANSA	LAXP4	Jacksonville	8	8	0	19	25	0	19	0	20	2	0	0	101
STAR HARMONIA	LAGB5	Baltimore	52	25	20	18	8	0	0	16	0	33	0	0	172
STAR HERDLA	LAVD4	Baltimore	23	0	0	47	67	26	35	41	18	28	0	0	285
STAR HIDRA	LAVN4	Baltimore	0	0	0	0	23	10	14	12	6	0	0	0	65
STAR ISMENE	LANT5	Baltimore	28	47	29	18	8	26	19	0	0	34	0	0	209
STAR ISTIND	LAMP5	Houston	16	32	29	22	24	24	24	24	27	2	0	0	224
STAR JAPAN	LAZV5	Baltimore	9	38	19	52	9	26	18	18	25	25	0	0	239
STAR JUVENTAS	LAZU5	Baltimore	0	0	5	7	16	0	0	0	0	0	0	0	28

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
STATENDAM	PHSG	Miami	68	61	38	2	16	74	80	48	80	65	0	0	532
STELLAR SEA	KGCJ	Kodiak	1	0	0	0	6	0	9	4	0	0	0	0	20
STEWART J. CORT	WDC6055	Chicago	6	0	1	93	106	75	68	97	72	79	0	0	597
STIMSON	KF002	Kodiak	100	51	72	24	2	51	58	0	8	7	0	0	373
STRONG PATRIOT	WCZ8589	Norfolk	82	1	0	45	82	40	71	49	49	67	0	0	486
SUMIDA	3FMX7	New York City	119	140	41	2	4	6	0	0	0	68	0	0	380
SUNBELT SPIRIT	V7DK4	New York City	15	12	6	4	0	0	0	0	0	0	0	0	37
SUSAN MAERSK	OYIK2	Seattle	21	27	0	52	14	0	0	0	0	0	0	0	114
SVEND MAERSK	OYJS2	Seattle	0	26	9	18	41	0	50	4	7	29	0	0	184
SWIFT ARROW	C6NI7	Anchorage	17	28	38	23	43	21	21	35	24	27	0	0	277
SYNERGY	WWF65	Kodiak	0	0	0	0	58	20	0	0	0	0	0	0	78
T/V ENTERPRISE	KVMU	New York City	17	29	0	0	0	0	0	0	0	0	0	0	46
T/V STATE OF MAINE	WCAH	Charleston	0	0	0	0	55	51	0	0	0	0	0	0	106
TAIO FRONTIER	3EZF5	Anchorage	10	2	8	6	0	0	0	10	0	0	0	0	36
TALISMAN	LAOW5	Jacksonville	0	0	0	13	0	26	21	0	0	0	0	0	60
TAMESIS	LAOL5	Norfolk	0	0	0	0	6	0	0	0	0	0	0	0	6
TAMPA	LMWO3	Baltimore	23	20	31	35	36	23	6	27	26	19	0	0	246
TAN'ERLIQ	WCY8497	Valdez	3	7	3	0	0	0	0	0	0	0	0	0	13
THOMAS G. THOMPSON	KTDQ	Seattle	8	54	67	51	27	53	6	56	15	0	0	0	337
THOMAS JEFFERSON	WTEA	Norfolk	0	0	0	77	50	0	0	0	0	0	0	0	127
TIGLAX	WZ3423	Anchorage	0	0	0	0	5	3	6	18	15	0	0	0	47
TINA LITRICO	KCKB	New Orleans	55	39	8	0	43	1	31	42	59	50	0	0	328
TITAN	WAW9232	Kodiak	2	10	20	7	10	0	0	0	0	0	0	0	49
TORDENSKJOLD	WB3888	Kodiak	0	0	0	0	0	2	2	5	0	0	0	0	9
TREIN MAERSK	MSQQ8	Baltimore	16	20	16	32	22	33	53	15	17	13	0	0	237
TRITON	WDC9955	Kodiak	0	0	0	0	0	0	0	0	0	3	0	0	3
TROPIC ATLANTIC	V2OW4	Miami	0	0	0	0	0	0	43	40	34	75	0	0	192
TROPIC CANADA	V2OW1	Miami	0	0	0	0	0	0	16	15	18	15	0	0	64
TROPIC NIGHT	J8NX	Miami	0	0	0	0	0	0	65	59	33	8	0	0	165
TROPIC PALM	J8PB	Miami	0	0	0	0	0	0	2	0	0	0	0	0	2
TROPIC SUN	J8AZ2	Miami	0	0	0	0	0	0	14	9	11	11	0	0	45
TUSTUMENA	WNGW	Kodiak	0	0	0	47	28	18	46	23	24	70	0	0	256
TYCO DECISIVE	V7DI7	Baltimore	0	0	0	0	0	55	64	49	25	0	0	0	193
TYCO DURABLE	V7DI8	Baltimore	0	0	0	0	4	0	0	0	0	0	0	0	4
TYCOM RELIANCE	V7CZ2	Baltimore	0	0	0	0	33	0	0	0	0	0	0	0	33
UBC SAIKI	P3GY9	Seattle	49	38	42	69	53	40	78	36	37	46	0	0	488
UBC SVEA	P3JA8	Seattle	27	25	36	17	34	22	51	34	28	32	0	0	306
UNITED SPIRIT	ELYB2	Seattle	80	68	75	70	66	80	74	59	58	66	0	0	696
UNIVERSAL SPIRIT	ELNT7	New York City	36	5	0	0	0	0	0	0	0	0	0	0	41
USCGC ALEX HALEY	NZPO	Kodiak	7	10	0	0	0	0	0	0	0	0	0	0	17
USCGC EAGLE	NRCB	Kodiak	0	0	0	0	0	0	1	0	0	0	0	0	1
USCGC HEALY	NEPP	Seattle	0	0	0	7	184	61	148	113	8	8	0	0	529
USCGC MAPLE (WLB 207)	NWBE	Kodiak	9	3	5	0	0	0	0	0	0	0	0	0	17
USCGC POLAR SEA	NRUO	Seattle	0	0	0	0	0	0	19	107	0	0	0	0	126
USCGC POLAR STAR	NBTM	Seattle	75	176	150	0	0	0	0	0	0	0	0	0	401
VALDEZ RESEARCH	WXJ63	Valdez	221	204	191	220	230	222	238	231	230	229	0	0	2216
VALENCIA BRIDGE	HOUU	Anchorage	50	31	55	55	53	36	35	28	37	56	0	0	436
VANCOUVER BRIDGE	H8FE	Seattle	10	6	7	3	0	0	0	0	12	7	0	0	45
VEENDAM	PHEO	Miami	0	41	39	21	22	42	32	37	25	71	0	0	330
VEGA VOYAGER	C6FV3	Anchorage	0	0	0	0	0	0	0	52	9	17	0	0	78
VIKING STAR	WAS4138	Kodiak	6	1	5	0	5	0	0	0	0	4	0	0	21
VINCENT THOMAS BRIDGE	H3WJ	New York City	53	22	51	43	20	26	0	0	0	0	0	0	215

VOS Cooperative Ship Report

Ship Name	Call	Port	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
VIRGINIA BRIDGE	HOKP	Anchorage	50	47	36	30	45	39	58	46	30	43	0	0	424
VIRGINIAN	KSPH	Houston	0	2	7	0	6	0	0	0	0	0	0	0	15
VLADIVOSTOK	P3BJ8	Seattle	2	0	0	0	0	0	0	0	30	29	0	0	61
VOLENDAM	PCHM	Anchorage	0	0	40	12	37	69	27	19	37	52	0	0	293
WALTER J MCCARTHY JR	WXU3434	Chicago	0	0	0	0	0	0	0	0	0	15	0	0	15
WARRIOR	WBN4383	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
WASHINGTON VOYAGER	KFDB	Oakland	0	0	0	26	4	0	28	20	0	0	0	0	78
WECOMA	WSD7079	Seattle	0	0	0	18	49	34	19	99	61	31	0	0	311
WELLINGTON EXPRESS	VSUA5	Anchorage	0	0	0	0	0	0	8	7	10	13	0	0	38
WESTERDAM	PINX	Miami	18	44	44	32	3	27	24	45	26	39	0	0	302
WESTERN MARINER	WRB9690	Kodiak	0	0	0	0	0	0	0	1	0	0	0	0	1
WESTERN PATRIOT	HP7161	Anchorage	0	0	0	0	0	0	0	0	0	20	0	0	20
WESTERN RANGER	WBN3008	Kodiak	0	0	0	5	40	29	36	94	2	123	0	0	329
WESTRAC II	WCU4545	Kodiak	0	0	0	0	8	0	2	3	0	5	0	0	18
WESTWARD	WDB4655	New York City	0	0	0	33	8	0	0	0	0	0	0	0	41
WESTWARD VENTURE	KHJB	Seattle	1	0	25	29	37	0	0	4	29	55	0	0	180
WESTWOOD ANETTE	C6QO9	Seattle	15	14	8	17	1	16	4	1	2	6	0	0	84
WESTWOOD COLUMBIA	C6SI4	Seattle	47	44	38	50	36	7	0	38	38	0	0	0	298
WESTWOOD MARIANNE	C6QD3	Seattle	57	11	24	6	10	14	16	7	1	1	0	0	147
WESTWOOD OLYMPIA	C6UB2	Seattle	42	37	42	0	0	0	25	21	6	19	0	0	192
WESTWOOD RAINIER	C6SI3	Seattle	26	21	60	59	70	31	11	19	27	76	0	0	400
WESTWOOD VICTORIA	C6SI6	Seattle	31	30	15	0	0	26	49	26	22	25	0	0	224
WILFRED SYKES	WDA2769	Chicago	0	0	1	23	32	47	38	48	20	14	0	0	223
WILSON	WNPD	New Orleans	22	12	37	11	38	0	0	19	16	4	0	0	159
WOLDSTAD	KF001	Kodiak	10	4	0	33	37	42	32	0	0	3	0	0	161
WOLVERINE	WDD3521	Chicago	0	0	0	0	0	0	0	0	0	23	0	0	23
WORLD SPIRIT	ELWG7	Seattle	3	85	83	79	80	55	75	53	58	80	0	0	651
YM GENOVA II	A8JC8	New York City	62	50	52	39	44	44	37	33	39	90	0	0	490
ZAANDAM	PDAN	Miami	21	43	52	103	275	145	30	32	35	182	0	0	918
ZENITH	C6FU3	Miami	9	4	0	0	2	5	4	6	7	8	0	0	45
ZIM AMERICA	9HAB8	New York City	46	35	0	24	48	0	19	49	57	58	0	0	336
ZIM BEIJING	A8FU7	New York City	8	5	6	3	9	0	0	0	0	15	0	0	46
ZIM HONG KONG	9HGP7	Houston	50	0	3	54	0	0	0	0	0	0	0	0	107
ZIM ITALIA	4XGT	New Orleans	32	41	0	0	0	0	35	22	74	42	0	0	246
ZIM SAVANNAH	A8ER9	New York City	14	3	13	14	9	12	30	8	7	12	0	0	122
ZIM SHANGHAI	SVBC	New York City	0	8	15	15	5	8	11	1	0	0	0	0	63
ZIM XIAMEN	MLCA2	New York City	0	0	0	0	0	0	0	0	13	27	0	0	40
ZUIDERDAM	PBIG	Anchorage	17	11	8	0	7	0	72	25	4	15	0	0	159

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TOTAL SHIPS: 760	16457	15086	15840	17574	19384	18529	20736	19924	18170	20959	0	0	182659

Points of Contact

U.S. Port Meteorological Officers

Headquarters

Jeff Jenner
Voluntary Observing Ship Project Manager
National Data Buoy Center
Building 1100
Stennis Space Center, MS 39529-6000
Tel: 228-688-2784
Fax: 228-688-3153
E-mail: jeff.jenner@noaa.gov

Robert A. Luke
Voluntary Observing Ship Operations Manager
National Data Buoy Center
Building 3203
Stennis Space Center, MS 39529-6000
Tel: 228-688-1457
Fax: 228-688-3923
E-mail: robert.luke@noaa.gov

Atlantic Ports

Peggy Alander, PMO
National Weather Service, NOAA
2550 Eisenhower Blvd, Suite 312
P.O. Box 165504
Port Everglades, FL 33316
Tel: 954-463-4271
Fax: 954-462-8963
E-mail: peggy.alander@noaa.gov

John Warrelmann, PMO
National Weather Service, NOAA
13701 Fang Road
Jacksonville, FL 32218-7933
Tel: 904-741-5186 Ext. 117
Fax: 904-741-0078
E-mail: john.warrelmann@noaa.gov

Tim Kenefick, PMO
NOAA Coastal Services Center
2234 South Hobson Avenue
Charleston, SC 29405-2413
Tel: 843-740-1281
Fax: 843-740-1289
E-mail: timothy.kenefick@noaa.gov

Peter Gibino, PMO
National Weather Service, NOAA
4034-B Geo. Wash. Mem. Hwy.
Yorktown, VA 23692-2724
Tel: 757-877-1692
Fax: 757-877-9561
E-mail: peter.gibino@noaa.gov

James Saunders, PMO
National Weather Service, NOAA
Maritime Center I, Suite 287
2200 Broening Highway
Baltimore, MD 21224-6623
Tel: 410-633-4709
Fax: 410-633-4713
E-mail: james.saunders@noaa.gov

Jim Luciani, PMO
New York/New Jersey
National Weather Service, NOAA
110 Main Street, Suite 201
South Amboy, NJ 08879-1367
Tel: 732-316-5409
Fax: 732-316-7643
E-mail: james.luciani@noaa.gov

Great Lakes Ports

Amy Seeley, PMO
National Weather Service, NOAA
333 West University Dr.
Romeoville, IL 60446-1804
Tel: 815-834-0600 Ext. 269
Fax: 815-834-0645
E-mail: amy.seeley@noaa.gov

Gulf of Mexico Ports

Paula Campbell, PMO
National Weather Service, NOAA
Louis Armstrong Int'l Airport, Box 20026
New Orleans, LA 70141
Tel: 504-589-4839
E-mail: paula.campbell@noaa.gov

Chris Fakes, PMO
National Weather Service, NOAA
1353 FM646
Suite 202
Dickinson, TX 77539
Tel: 281-534-2640 Ext. 277
Fax: 281-534-4308
E-mail: chris.fakes@noaa.gov

Pacific Ports

Derek LeeLoy
Ocean Services Program Coordinator
National Weather Service Pacific Region HQ
Grosvenor Center, Mauka Tower
737 Bishop Street, Suite 2200
Honolulu, HI 96813-3201
Tel: 808-532-6439
Fax: 808-532-5569
E-mail: derek.leeloy@noaa.gov

Robert Webster, PMO
National Weather Service, NOAA
501 West Ocean Blvd., Room 4480
Long Beach, CA 90802-4213
Tel: 562-980-4090
Fax: 562-436-1550
E-mail: bob.webster@noaa.gov

PMO
National Weather Service, NOAA
1301 Clay Street, Suite 1190N
Oakland, CA 94612-5217
Tel:
Fax:
E-mail: vos@noaa.gov

Patrick Brandow, PMO
National Weather Service, NOAA
7600 Sand Point Way, N.E., BIN C15700
Seattle, WA 98115-6349
Tel: 206-526-6100
Fax: 206-526-4571 or 6094
E-mail: pat.brandow@noaa.gov

Richard Courtney
National Weather Service, NOAA
600 Sandy Hook Street, Suite 1
Kodiak, AK 99615-6814
Tel: 907-487-2102
Fax: 907-487-9730
E-mail: richard.courtney@noaa.gov

Debra Elliott, OIC
National Weather Service, NOAA,
Box 427
Valdez, AK 99686-0427
Tel: 907-835-4505
Fax: 907-835-4598
E-mail: debra.elliott@noaa.gov

Larry Hubble
National Weather Service Alaska Region
222 West 7th Avenue #23
Anchorage, AK 99513-7575
Tel: 907-271-5135
Fax: 907-271-3711
E-mail: larry.hubble@noaa.gov

NIMA Fleet Liaisons

Adam Veracka, Fleet Liaison Branch Head
QMCM Randy Bryant, Fleet Liaison Coordinator
ATTN: Mail Stop D-44
4600 Sangamore Road
Bethesda, MD 20816-5003
Tel: 301-227-3173/3146
Fax: 301-227-4211
E-mail: veracka@nima.mil
bryantral@nima.mil

U.S. Coast Guard AMVER Center

Ben Strong, AMVER Maritime Relations Officer, United States Coast Guard
Battery Park Building
New York, NY 10004
Tel: 212-668-7762
Fax: 212-668-7684
E-mail: bmstrong@batteryny.uscg.mil

SEAS Field Representatives

GOOS Center Manager
Steve Cook
8604 La Jolla Shores Drive
La Jolla, CA 92037-1508
Tel: 858-546-7103
Fax: 619-546-7185
E-mail: steven.cook@noaa.gov

Northeast Atlantic SEAS Rep.
Jim Farrington
SEAS Logistics/AMC
439 West York Street
Norfolk, VA 23510
Tel: 757-441-3062
Fax: 757-441-6495
E-mail: james.w.farrington@noaa.gov

Pacific Northwest SEAS Rep.
Steve Noah
SEAS Logistics/PMC
Olympic Computer Services, Inc.
Tel: 360-385-2400
Cell: 425-238-6501
E-mail: snoah@olycomp.com
or KARSTENO@aol.com

Southwest Pacific SEAS Rep.
Carrie Wolfe
Southern California Marine Institute
820 S. Seaside Avenue
San Pedro, Ca 90731-7330
Tel: 310-519-3181
Fax: 310-519-1054
E-mail: hbbio048@csun.edu

Southeast Atlantic SEAS Rep.
Ann-Marie Wilburn
AOML/GOSO Center
4301 Rickenbacker Causeway
Miami, FL 33149-1026
Tel: 305-361-4336
Fax: 305-361-4366
E-mail: wilburn@aoml.noaa.gov

Global Drifter Program
Craig Engler
AOML/PHOD
4301 Rickenbacker Causeway
Miami, FL 33149-1026
Tel: 305-361-4439
Fax: 305-361-4366
E-mail: craig.engler@noaa.gov

Other Port Meteorological Officers

Argentina

Mario J. Garcia, Jefe del Dto. Redes
Servicio Meteorlógico Nacional
25 de Mayo 658 (C1002ABN)
Buenos Aires
Argentina
Tel: +54-11 4514 1525
Fax: +54-11 5167 6709
E-mail: garcia@meteofa.mil.ar

Australia

Head Office
Graeme Ball, Mgr.,
Marine Observations Group
Bureau of Meteorology
GPO Box 1289K
Melbourne, VIC 3001
Australia
Tel: +61-3 9669 4203
Fax: +61-3 9669 4168
E-mail: smmo@bom.gov.au
Group E-mail: marine_obs@bom.gov.au

Fremantle
Malcolm (Mal) Young, PMA
c/o Bureau of Meteorology
PO Box 1370
West Perth WA 6872
Australia
Tel: +61-8 9474 1974
Fax: +61-8 6210 1801
E-mail: PMA.Freemantle@bom.gov.au

Melbourne
Albert Dolman, PMA
c/o Bureau of Meteorology
GPO Box 1636M
Melbourne, Vic. 3001
Australia
Tel: +61-4 3858 7341
Fax: +61-3 5229 5432
E-mail: PMA.Melbourne@bom.gov.au

Sydney
Capt. Einion E. (Taffy) Rowlands, PMA
c/o Bureau of Meteorology
GPO Box 413
Darlinghurst NSW 1300
Australia
Tel:+61-2 9296 1547
Fax: +61-2 9296 1648
E-mail: PMA.Sydney@bom.gov.au

Canada

Canadian Headquarters
Gerie Lynn Lavigne, Life Cycle Manager
Marine Networks, Environment Canada
4905 Dufferin Street
Toronto, Ontario
Canada M3H 5T4
Tel: +1-416 739 4561
Fax: +1-416 739 4261
E-mail: gerielynn.lavigne@ec.gc.ca

British Columbia
Mike Riley, PMO, Environment Canada
700-1200 West 73rd Avenue
Vancouver, British Columbia V6P 6H9
Canada
Tel: +1-604 664 9136
Cell: +1-604 219 5832
Fax: +1-604 664 4094
E-mail: mike.riley@ec.gc.ca

Newfoundland
Jack Cossar, PMO
Environment Canada
6 Bruce Street
St Johns, Newfoundland A1N 4T3
Canada
Tel: 1+-709 772 4798
Fax: 1+709 772 5097
E-mail: jack.cossar@ec.gc.ca

Nova Scotia
Randy Sheppard, PMO
Meteorological Service of Canada
16th Floor, 45 Aldernay Drive
Dartmouth, Nova Scotia B2Y 2N6
Canada
Tel: 1+902 426 6703
E-mail: randy.sheppard@ec.gc.ca

Ontario
Tony Hilton , Supervisor PMO,
Rick Shukster, PMO &
Roland Kleer, PMO
Environment Canada
Meteorological Service of Canada
100 East Port Blvd.
Hamilton, Ontario L8H 7S4
Canada
Tel: +1-905 312 0900
Fax: +1-905 312 0730
E-mail: tony.hilton@ec.gc.ca
roland.kleer@ec.gc.ca
rick.shukster@ec.gc.ca

Quebec
Eric Gola, PMO
Meteorological Service of Canada-Quebec Region
100 Alexis Nihon, Suite 300, 3rd Floor
Montreal, Quebec H4M 2N8
Tel: 514-283-1644
514-386-8269
Fax: 514-496-1867
E-mail: erich.gola@ec.gc.ca

China

YU Zhaoguo
Shanghai Meteorological Bureau
166 Puxi Road
Shanghai, China

Croatia

Port of Rijeka
Smiljan Viskovic
Marine Meteorological Office–Rijeka
Riva 20
HR-51000 Rijeka
Croatia
Tel: +385-51 215 548
Fax: +385-51 215 574

Port of Split
Captain Zeljko Sore
Marine Meteorological Office–Split
P.O. Box 370
Glagoljaska 11
HR-21000 Split
Croatia
Tel: +385-21 589 378
Fax: +385-21 591 033 (24 hours)
E-mail: sore@cirus.dhz.hr

Denmark

Cmdr Roi Jespersen, PMO &
Cmdr Harald R. Joensen, PMO
Danish Meteorological Inst., Observation Dept
Surface and Upper Air Observations Division
Lyngbyvej 100
DK-2100 Copenhagen
Denmark
Tel: +45 3915 7337
Fax: +45 3915 7390
E-mail: rj@dmi.dk
hrj@dmi.dk

Falklands

Captain R. Gorbutt, Marine Officer
Fishery Protection Office
Port Stanley
Falklands
Tel: +500 27260
Fax: +500 27265
Telex: 2426 FISHDIR FK

France

Headquarters
André Péries, PMO Supervisor
Météo-France DSO/RESO/PMO
42, Avenue Gustave Coriolis
31057 Toulouse Cédex
France
Tel: +33-5 61 07 98 54
Fax: +33-5 61 07 98 69
E-mail: andre.peries@meteo.fr

Boulogne-sur-mer
Gérard Doligez
Météo-France DDM62
17, boulevard Sainte-Beuve
62200 Boulogne-sur-mer
France
Tel: +33-3 21 10 85 10
Fax: +33-2 21 33 33 12
E-mail: gerard.doligez@meteo.fr

Brest
Louis Stéphan, Station Météorologique
16, quai de la douane
29200 Brest
France
Tel: +33-2 98 44 60 21
Fax: +33-2 98 44 60 21

La Réunion
Yves Morville, Station Météorologique
Port Réunion
France
Fax: +262 262 921 147
Telex: 916797RE
E-mail: dirre@meteo.fr
meteo.france.leport@wanadoo.fr

Le Havre
Andre Devatine, Station Météorologique
Nouveau Sémaphore
Quai des Abeilles
76600 Le Havre
France
Tel: +33-2 32 74 03 65
Fax: +33 2 32 74 03 61
E-mail: andre.devatine@meteo.fr

Marseille
Michel Perini, PMO
Météo-France / CDM 13
2A BD du Château-Double
13098 Aix en Provence Cédex 02
France
Tel: +00 33 (0)4 42 95 25 42
Fax: +00 33 (0)4 42 95 25 49
E-mail: michel.perini@meteo.fr

Montoir de Bretagne
Jean Beaujard, Station Météorologique
Aérodome de Saint-Nazaire-Montoir
44550 Montoir de Bretagne
France
Tel: +33-2 40 17 13 17
Fax: +33-2 40 90 39 37

New Caledonia
Henri Lévèque, Station Météorologique
BP 151
98845 Noumea Port
New Caledonia
France
Tel: +687 27 30 04
Fax: +687 27 42 95

Germany

Headquarters
Volker Weidner, PMO Advisor
Deutscher Wetterdienst
Bernhard-Nocht-Strasse 76
D-20359 Hamburg
Germany
Tel: +49-40 6690 1410
Fax: +49-40 6690 1496
E-mail: pmo@dwd.de

Bremen
Ulrich Ranke, PMO
Deutscher Wetterdienst
Flughafendamm 45
D-28199 Bremen
Germany
Tel: +49-421 5372 163
Fax: +49-421 5372 166
E-mail: pmo@dwd.de

Bremerhaven
Henning Hesse, PMO
Deutscher Wetterdienst
An der Neuen Schleuse 10b
D-27570 Bremerhaven
Germany
Tel: +49-471 70040-18
Fax: +49-471 70040-17
E-mail: pmo@dwd.de

Hamburg
Peter Gollnow, PMO &
Horst von Bargen, PMO
Deutscher Wetterdienst
Bernhard-Nocht-Strasse 76
D - 20359 Hamburg
Germany
Tel: +49-40 6690 1411 or 1412
Fax: +49 40 6990 1496
E-mail: pmo@dwd.de

Rostock
Christine Bergs, PMO &
Christel Heidner, PMO
Deutscher Wetterdienst
Seestrasse 15a
D-18119 Rostock
Germany
Tel: +49 381 54388-30/31
Fax: +49 381 54388-63
E-mail: pmo@dwd.de

Points of Contact

Gilbraltar

Principal Meteorological Officer
Meteorological Office
RAF Gilbraltar BFPO 52
Gilbraltar
Tel: +350 53419
Fax: +350 53474

Greece

Michael Myrsilidis, Marine Meteorology Section
Hellenic National Meteorological Service
(HNMS)
El, Venizelou 14
16777 Hellinikon
Athens
Greece
Tel: +30-10 9699013
Fax: +30-10 9628952, 9649646
E-mail: mmirsi@hnms.gr

Hong Kong, China

Wing Tak Wong, Senior Scientific Officer
Hong Kong Observatory
134A Nathan Road
Kowloon
Hong Kong, China
Tel: +852 2926 8430
Fax: +852 2311 9448
E-mail: wtwong@hko.gov.hk

Iceland

Hreinn Hjartarson, Icelandic Met. Office
Bústadavegur 9
IS-150 Reykjavik
Iceland
Tel: +354 522 6000
Fax: +354 522 6001
E-mail: hreinn@vedur.is

India

Calcutta
Port Meteorological Office
Alibnagar, Malkhana Building
N.S. Dock Gate No. 3
Calcutta 700 043
India
Tel: +91-33 4793167

Chennai
Port Meteorological Office
10th Floor, Centenary Building
Chennai Port Trust, Rajaji Road
Chennai 600 001
India
Tel: +91-44 560187

Fort Mumbai
Port Meteorological Office
3rd Floor, New Labour Hamallage Building
Yellow Gate, Indira Doct
Fort Mumbai 400 001
India
Tel: +91-2613733

Goa
PMO, Port Meteorological Liaison Office
Sada, P.O., Head Land Sada
Goa 403 804
India
Tel: +91-832 520012

Kochi
Port Meteorological Office
Cochin Harbour, North End, Wellington Island
Kochi 682 009
India
Tel: +91-484 667042

Visakhapatnam
Port Meteorological Office
c/o The Director, Cyclone Warning Centre
Chinna Waltair
Visakhapatnam 530 017.Andra Pradesh
India
Tel: +91-891 746506

Indonesia

Belawan
Stasiun Meteorologi Maritim Belawan
Jl. Raya Pelabuhan III
Belawan - 20414
Indonesia
Tel: +62-21 6941851
Fax: +62-21 6941851

Bitung
Stasiun Meteorologi Maritim Bitung
Jl. Kartini No. 1
Bitung - 95524
Indonesia
Tel: +62-438 30989
Fax: +62-438 21710

Jakarta
Mochamad Rifangi
Meteorological and Geophysical Agency
Jl. Angkasa I No. 2 Kemayoran
Jakarta - 10720
Indonesia
Tel: +62-21 4246321
Fax: +62-21 4246703

Stasiun Meteorologi Maritim Tanjung Priok
Jl. Padamarang Pelabuhan
Tanjung Priok
Jakarta - 14310
Indonesia
Tel: +62-21 4351366
Fax: +62-21 490339

Makassar
Stasiun Meteorologi Maritim Makassar
Jl. Sabutung I No. 20 Paotere
Makassar
Indonesia
Tel: +62-411 319242
Fax: +62-411 328235

Semarang
Stasiun Meteorologi Maritim Semarang
Jl. Deli Pelabuhan
Semarang - 50174
Indonesia
Tel: +62-24 3549050
Fax: +62-24 3559194

Surabaya
Stasiun Meteorologi Maritim Surabaya
Jl. Kalimas baru No. 97B
Surabaya - 60165
Indonesia
Tel: +62-31 3291439
Fax: +62-31 3291439

Ireland

Cork
Brian Doyle, PMO
Met Eireann
Cork Airport
Cork
Ireland
Tel: +353-21 4917753
Fax: +353-21 4317405

Donegal
Paddy Delaney, Station Manager
Met Eireann
Cork Airport
MalinHead
Lifford
Co. Donegal
Ireland

Dublin
Columba Creamer, Marine Unit
Met Eireann
Glasnevin Hill
Dublin 9
Ireland

Mayo
Andy Clohessy, Station Manager
Connaught International Airport
Charleston
Co. Mayo
Ireland

Wexford
Dennis O. Mahoney, Station Manager
Met Eireann
Rossiare Harbour
Wexford
Ireland
Tel: +353-53 33113
Fax: +353-53 33105
E-mail: met.rossiarre@eircom.net

Israel

Ashdod
Aharon Ofir, PMO
Marine Department
Ashdod Port
Tel: 972 8 8524956

Haifa
Hani Arbel, PMO
Haifa Port
Tel: 972 4 8664427

Japan

Headquarters
Dr. Kazuhiko Hayashi, Scientific Officer
Marine Div., Climate and Marine Dept.
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
Tokyo, 100-8122
Japan
Tel: +81-3 3212 8341 ext. 5144
Fax: +81-3 3211 6908
hayashik@met.kishou.go.jp
Email: VOS@climar.kishou.go.jp

Kobe
Port Meteorological Officer
Kobe Marine Observatory
1-4-3, Wakinohamakaigan-dori, Chuo-ku
Kobe 651-0073
Japan
Tel: +81-78 222 8918
Fax: +81-78 222 8946

Nagoya
Port Meteorological Officer
Nagoya Local Meteorological Observatory
2-18, Hiyori-ho, Chigusa-ku
Nagoya, 464-0039
Japan
Tel: +81-52 752 6364
Fax: +81-52 762-1242

Yokohama
Port Meteorological Officer
Yokohama Local Meteorological Observatory
99 Yamate-cho, Naka-ku
Yokohama, 231-0862
Japan
Tel: +81-45 621 1991
Fax: +81-45 622 3520
Telex: 2222163

Kenya
Ali Juma Mafimbo, PMO
PO Box 98512
Mombasa
Kenya
Tel: +254-11 225687 / 433689
Fax: +254-11 433689
E-mail: mafimbo@lion.meteo.go.ke

Malaysia

Port Bintulu
Paul Chong Ah Poh, PMO
Bintulu Meteorological Station
P.O. Box 285
97007 Bintulu
Sarawak
Malaysia
Fax: +60-86 314 386

Port Klang
Mohd Shah Ani, PMO
Malaysian Meteorological Service
Jalan Sultan
46667 Petaling Jaya
Selangor
Malaysia
Fax: +60-3 7957 8046

Port Kinabalu
Mohd Sha Ebung, PMO
Malaysian Meteorological Service
7th Floor, Wisma Dang Bandang
P.O. Box 54
88995 Kota Kinabalu
Sabah
Malaysia
Fax: +60-88 211 019

Mauritius -
Port Louis
Meteorological Services
St. Paul Road
Vacoas
Mauritius
Tel: +230 686 1031/32
Fax: +230 686 1033
E-mail: meteo@intnet.mu

Netherlands
Bert de Vries, PMO &
René Rozeboom, PMO
KNMI, PMO-Office
Wilhelminalaan 10
Postbus 201
3730 Ae de Bilt
Netherlands
Tel: +31-30 2206391
Fax: +31-30 2210849
E-mail: PMO-Office@knmi.nl

New Zealand
Julie Fletcher, MMO
Meteorological Service New Zealand Ltd.
P.O. Box 722
Wellington
New Zealand
Tel: +64-4 4700 789
Fax: +64-4 4700 772

Norway
Tor Inge Mathiesen, PMO
Norwegian Meteorological Institute
Allégaten 70
N-5007 Bergen
Norway
Tel: +47-55 236600
Fax: +47-55 236703
Telex: 40427/42239

Pakistan

Hazrat Mir, Senior Meteorologist
Pakistan Meteorological Department
Meteorological Office
Jinnah International Airport
Karachi
Pakistan
Tel:+ 92-21 45791300, 45791322
Fax: +92-21 9248282
E-mail: pmdmokar@khi.paknet.com.pk

Philipines

Cagayan de Oro City
Leo Rodriguez
Pagasa Complex Station
Cagayan de Oro City 9000, Misamis Occidental
Philipines
Tel: +63-8822 722 760

Davao City
Edwin Flores
Pagasa Complex Station, Bangoy Airport
Davao City 8000
Philipines
Tel: +63-82 234 08 90

Dumaguete City
Edsin Culi
Pagasa Complex Station
Dumaguete City Airport
Dumaguete City, Negros Oriental 6200
Philipines
Tel: +63-35 225 28 04

Legaspi City
Orthello Estareja
Pagasa Complex Station
Legaspi City, 4500
Philipines
Tel: +63-5221 245 5241

Iloilo City
Constancio Arpon, Jr.
Pagasa Complex Station
Iloilo City 5000
Philipines
Tel: +63-33 321 07 78

Mactan City
Roberto Entrada
Pagasa Complex Station, Mactan Airport
Mactan City, CEBU 6016
Philipines
Tel: +63-32 495 48 44

Manila
Dr. Juan D. Cordeta &
Benjamin Tado, Jr.
Pagasa Port Meteorological Office
PPATC Building, Gate 4
South Harbor
Manila 1018
Philipines 1100
Tel: +63-22 527 03 16

Poland

Józef Kowalewski, PMO Gdynia and Gdansk
Institute of Meteorology and Water Management
Waszyngton 42
PL-81-342 Gdynia
Poland
Tel: +48-58 6204572
Fax: +48-58 6207101
Telex: 054216
E-mail: kowalews@stratus.imgw.gdynia.pl

Republic of Korea

Inchon
Inchon Meteorological Station
25 Chon-dong, Chung-gu
Inchon
Republic of Korea
Tel: +82-32 7610365
Fax: +82-32 7630365

Pusan
Pusan Meteorological Station
1-9 Taechong-dong, Chung-gu
Pusan
Republic of Korea
Tel: +82-51 4697008
Fax: +82-51 4697012

Russian Federation

Ravil S. Fakhrutdinov
Roshydromet
12, Novovagan'kovsky Street
Moscow 123242
Russian Federation
Tel:+7-095 255 23 88
Fax: +7-095 255 20 90
Telex: 411117 RUMS RF
E-mail: marine@mcc.mecom.ru
fakhrutdinov@rhmc.mecom.ru

Saudi Arabia

Mahmoud M. Rajkhan, PMO
Meteorology and Environmental Protection
Administration (MEPA)
P.O. Box 1358
Jeddah 21431
Saudi Arabia
Tel: +966-2 6512312 Ext. 2252 or 2564

Singapore

Amran bin Osman, PMS
Meteorological Service
PO Box 8
Singapore Changi Airport
Singapore 9181
Tel: 5457198
Fax: +65 5457192
Telex: RS50345 METSIN

South Africa

Headquarters
Ian T. Hunter
Manager: Maritime Services
South African Weather Service
Private Bag X097
Pretoria 0001
Tel: +27 (0) 12 367 6032
Fax: +27 (0) 12 367 6042
Weatherline: 082 162
E-mail: ian@weathersa.co.za
www.weathersa.co.za

Cape Town
C. Sydney Marais, PMO
Cape Town Regional Weather Office
Cape Town International Airport
Cape Town 7525
South Africa
Tel: +27-21 934 0836
Fax: +27-21 934 3296
E-mail: maritime@weathersa.co.za

Durban
Gus McKay, PMO
Durban Regional Weather Office
Durban International Airpot
Durban 4029
South Africa
Tel: +27-31 408 1446
Fax: +27-31 408 1445
E-mail: mckay@weathersa.co.za

Sweden

Morgan Zinderland
SMHI
S-601 76 Norrköping, Sweden
Tel: 516-924-0499 (0227)

Tanzania, United Republic of

H. Charles Mwakitosi, PMO
P.O. Box 3056
Dar es Salaam
United Republic of Tanzania

Thailand

Kesrin Hanprasert, Meteorologist
Marine and Upper Air Observation Section
Meteorological Observation Division
Thai Meteorological Department
4353 Sukhumvit Road, Bangna
Bangkok 10260
Thailand
Tel: +66-2 399 4561
Fax: +66-2 398 9838
E-mail: Wattana@fc.nrct.go.th

United Kingdom

Headquarters
Sarah C. North, Marine Networks Manager
Met Office
Observations Supply - Marine Networks
FitzRoy Road
Exeter
Devon
EX1 3PB
United Kingdom
Tel: +44-1392 855 617
Fax: +44-870 900 5050
E-mail: sarah.north@metoffice.gov.uk
Group E-mail: Obsmar@metoffice.gov.uk

North England
Colin B. Attfield, PMO
Met office
c/o 12 Brackley Close
Wallasey
Merseyside CH44 3EJ
United Kingdom
Tel:+44-151 638 8516
Fax: +44-870 900 5050
E-mail: pmoliverpool@metoffice.gov.uk

South England
Captain Harry H. Gale, PMO &
Steve Key, PMO
Met Office
Trident House
21 Berth, Tilbury Dock
Tilbury, Essex RM18 7HL
United Kingdom
Tel: +44-1375 859 970
Fax: +44-1375 859 972
e-mail: pmolondon@metoffice.gov.uk

Scotland
Tony Eastham, PMO
Met Office
Saughton House, Broomhouse Drive
Edinburgh EH11 3XQ
United Kingdom
Tel: +44-131 528 7305
Fax: +44-131 528 7345
E-mail: pmoedinburgh@metoffice.gov.uk

Ian J. Hendry, Offshore Adviser
Met Office
Davidson House Campus 1
Aberdeen Science & Technology Park
Bridge of Don
Aberdeen AB22 8GT
United Kingdom
Tel: +44-1224 407 557
Fax: +44-1224 407 568
E-mail: ihendry@metoffice.gov.uk

United States Government
INFORMATION

Credit card orders are welcome!

order Processing Code:
* **5862**

Fax your orders (202) 512-2250
Phone your orders (202) 512-1800

☐ **YES, please send_____subscriptions to:**
Mariners Weather Log (MWL) at $19.00 ($26.00 foreign) per year (3 issues)

The total cost of my order is $_____
Price includes regular shipping & handling and is subject to change.

For privacy protection, check the box below:
☐ Do not make my name available to other mailers

Check method of payment:
☐ Check payable to: Superintendent of Documents
☐ GPO Deposit Account ☐☐☐☐☐☐ — ☐
☐ VISA ☐ MasterCard ☐ Discover
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐ (expiration date)

Name or title (Please type or print)
Company Name Room, floor, suite
Street Address
City State Zip Code + 4
Daytime phone including area code
Purchase order number (optional)
Authorizing signature 11/03

Mail to: Superintendent of Documents PO Box 371954, Pittsburgh PA 15250-7954
Important: Please include this completed order form with your remittance. ***Thank you for your order***

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Data Buoy Center
Building 3203
Stennis Space Center, MS 39529-6000
Attn: Mariners Weather Log

Address Correction Requested
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

Special
Standard Rate

In this Issue:

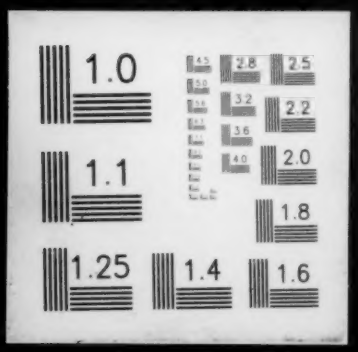
The Marine Observers' Log—"Wikilog" 4

Estimating the Wind Speed During a Hurricane 8

SUNY Maritime College Sea Term 2006 12

It's "Eight Bells for Longtime Marine Forecaster, Educator, and VOS Supporter, Lee Chesneau 19

GPO U.S. GOVERNMENT PRINTING OFFICE : 2006 — 634-741


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0